CHAPTER 4 - ANALYSIS OF THE ARTICLE

0. Introduction. The first section of the present chapter introduces the notation adopted in demarcating referential phrases and their referends in the analysis of the article. It also presents the various adjustments and rules of consequence and paraphrase applied in replacing referentials by their referends (cf. chapter 1, section 5). These adjustments and rules are referred to in the notes which follow the analysis, i.e., the article with annotation of its cross-references. The notes provide for each referential relation the rule of paraphrase (or consequence) and adjustments applied in effecting the replacement of the referential and contain additional commentary on various cross-referential relations.

1. Notation, Adjustments, and Rules of Consequence. Pagination - Except for the section headed "references", and the figures and tables (reprinted in section 3.2 of the preceding chapter), all of the article is reproduced in the analysis. Each sentence of the article is assigned a citation-numeral which precedes the given sentence, e.g., "193.1.1" refers to page number 193 of the article, the first paragraph, and first sentence. Non-initial sentences on a given page are generally referred to only by their paragraph and sentence number, e.g., "3.4" is to be read as "sentence number four of paragraph three". In many cases the citation-numeral is not in accord with the pagination

of the reprinted article: this is because sentences from a paragraph which begins on a previous page are cited in respect to the page on which that paragraph begins, e.g., the sentence in the article cited as 200.4.8 - the eighth sentence of the fourth full paragraph of page 200 - is the first sentence on page 202 of the reprinted article. For this reason page numbers in the citation will often not run consecutively, thus departing from the scheme of citation used in the appendices of FIS. The procedure of citation noted above has been adopted for purposes for further research: while pagination of articles is subject to conditions largely extraneous to the subject of cross-reference, particular types of referential relations may only obtain among occurrences of phrases within the same paragraph (as can readily be seen by a perusal of the annotated article, the general hypothesis that all referential relations are confined to paragraph boundaries, i.e., that referential and referend occur in the same paragraph, cannot be maintained for this article).

Enumeration of Referential Relations- Cross-references in the article are marked and enumerated in respect to the order of occurrence of referential phrases within the article. There are separate enumerations for each of the following sections (or: subsections): "Introduction", "Methods and Materials", "Preliminary Observations", "The Optimal Concentrations of Antigens", "Sequence of Events Following Injection of the Viral Antigens", "Histological

Changes in the Lymphnode", "Experiments Involving Different Serological Types of the Virus", "The Concentration of Antibody in Lymph-cells and Lymph-plasma ", "Discussion", "Summary", and "Acknowledgement". The third through the sixth of these comprise subsections under the section heading "Experimental". The four subsections of the "Methods and Materials" section were not individually considered inasmuch as (1) three of the subsections are quite brief and (2) it was of interest to note whether this section, comprising in the main sentences which are not instances of the sentence-types established for the immunology-sublanguage (chapter 2, section 2-3), displayed particular features, e.g., classifier-relations between referentials and referends, in its cross-referential relations (section 5 of chapter 5 addresses this question). Within each of the (sub-) sections mentioned, referential phrases are enumerated in order of the reading of the text. Referential phrases are enclosed in square brackets - the number assigned to a given referential phrase is indicated as a superscript to the right bracket. A lower case "a" or "e" is appended as a subscript to the left bracket to indicate that the referential phrase is anaphoric or epiphoric, respectively. Particular words which "signal" the referential status of a phrase, e.g., the, these in the antibody, these tissues, proforms such as here, there, and classifiers are indicated in capital letters. For instance - "[THE injection]$_{a}^{5}$" indicates the fifth (anaphoric)

referential phrase of a particular (sub)section - its status as a referential is noted by a capitalized definite article. A superscript-numeral appended at the end of a particular word indicates its status as an announcer (cf. chapter 3, section 3) of the zero-referential phrase with the same numeral, e.g., "antibody is produced^{6} [$\underline{\text{THERE}}_{a}$]^{6}". Zero-referential phrases along with the propositions, etc., which often accompany them are underlined to indicate that they do not occur explicitly in the text.

In many instances, reconstruction of a zero-referential requires that a phrase in the text be rewritten, e.g., "the regional lymphnodes" is rewritten as: "the lymphnodes regional to [THE site of injection]". The phrase which is rewritten in such cases is enclosed in curly brackets with a hyphen placed to the right of the right bracket in cases where the rewriting follows the phrase occurring in the text and otherwise to the left of the left bracket (cases of the latter are rare). The announcer e.g., regional above, of the zero-referential, receives its superscript numeral only in its initial occurrence and not in the rewritten expansion. Phrases which recur (e.g., regional) in the expansion are not underlined. In some cases, the entire phrase is rewritten and underlined, e.g., however as "in spite of [THIS]". The curly brackets often serve to indicate the scope of the phrase which announces the referential, e.g., further in the example below. For instance, further

evidence of specificity (from sentence 204.4.1) could be rewritten as "evidence of specificity further than [THAT evidence]" or "evidence of specificity further than [THAT evidence of specificity]". Enclosing the entire phrase in curly brackets indicates the latter as the required expansion.

Except for implicit assumptions - noted below - all phrases which do not occur explicitly in the text, i.e., are reconstructed, are underlined. In addition to reconstructions entailed by the establishment of zero-referentials, there are occasionally reconstructions of phrases which either have been zeroed on the basis of (a) repetition or (b) as "appropriate" operators in English (cf. section 2.1 of chapter 2; excluded here are cases of "sublanguage appropriate" operators discussed in FIS, chapter 5 section 4.2).

The conventions for underlining and rewriting phrases in the text permit the article to be recovered from annotated transcription presented as section 2 here. The article in its original form can be discerned by ignoring any phrases which are underlined (or are in angled brackets, see below) and reading those phrases indicated in curly brackets while ignoring the expanded rewritings. Nevertheless, the original article is reprinted as an appendix.

Notation of Referends - The referend of a given referential is enclosed in parentheses. The numeral given as a subscript to the right-hand parenthesis indicates the

referential for which the phrase serves as a referend, e.g., "(serum)$_5$" indicates the occurrence of serum as the referend of the correspondingly numbered referential. A particular occurrence of a phrase may be the referend of several referential-phrases; in this case, it receives a string of subscripts (separated by comma). The occurrence within the original article of citation-numerals enclosed in parentheses should not present a confusion with the notation for referends - only the latter are subscripted.

In a large number of cases, the whole number which serves as subscript to the parenthesized referend will be accompanied by a fraction. The denominator of the fraction indicates the number of parts (here called "components") of the phrase which serves as a referend; the numerator indicates which component of the referend is enclosed in parentheses. A fractional index for the components of a referend is often used in three cases: (1) where the referend is a discontiguous phrase in the text, (2) where the referend is referred to by referential-phrases such as two reasons (from 204.4.5), and (3) in connection with a special adjustment discussed below. For example, "(serum)$_{5\ 2/4}$" indicates that the parenthesized phrase is the second component of a four part referend for a referential-phrase numbered "5", "(serum)$_{3-5\ 1/3}$" indicates that serum is the first component of three for referentials numbered 3 and 5 (not 3 through 5).

There are quite a few cases of cross-references in which the referend is not indicated in the transcribed text. In some of these cases, indication of the referend would contribute to illegibility of the transcription. In others either no specific occurrence of a phrase can be designated as the referend, i.e., candidate referends of a given referential occur here and there (in the Notes, the referend is then termed passim), or the referend occurs in a prior section of the article. In all such cases, the referential phrase is marked with a prime ("'") next to the superscript numeral and the referend is indicated in the note to the referential phrase (see below).

It should be noted here that there are many instances of cross-reference in which the referend is a particular referential phrase. On the basis of such cross-references one can establish "chains" of referential relations. There are many questions that can posed regarding these chains, e.g., to what extent can further replacements be made, in what cases must a referential-phrase be considered an intermediate referend of a chain of referentials. These questions are not pursued in this work. Some cases in which the reader may disagree with the choice of referend indicated in the transcription may turn on these referential chains or the referends noted above as passim.

Independent Consideration of Cross-References - As noted in section 5.2 of chapter 1, referential-phrases are generally replaced by their (adjusted) referend in respect to a par-

ticular rule of consequence or paraphrase one-by-one, i.e., in respect to each referential-relation considered independently. This has two important implications for the analysis of the article. Firstly, the sentences of the article are not to be read with simultaneous reconstruction of all zero-referentials announced by particular phrases. Each referential-relation is negotiated, i.e., resolved, upon encountering the referential phrase; zero-referentials are thereafter considered to be absent in reading the sentence. As a consequence of this, it follows, secondly, that a referend within which zero-referentials have been constructed is taken (read) without these reconstructed phrases (the few exceptions to this convention are mentioned explicitly in the notes to the analysis). There are cases of cross-references in which simultaneous or ordered replacements of referential phrases is apparently required or would likely prove useful; some of these are addressed in section 1 of chapter 5.

Implicit Sentences - Tacit assumptions which are invoked to obtain - in accord with a rule of consequence - a consequence of a text-sentence in which a referend occurs (cf. chapter 1, section 2.4.2) are marked in angled brackets and prefaced by "Assumption". If an assumption is used repeatedly, the sentence-number in which it is first presented is noted. The consequence of a given text-sentence (or: sentence-fragment) and the tacit assumption is also

enclosed in angled brackets. The notes indicate the pertinent text-sentence which serves as a premiss - generally, it occurs immediately prior to the assumption stated.

The Notes to the Analysis - The notes provide for each relevant section or subsection a running commentary on the cross-referential relations within that portion of the text. Under each citation-numeral for a sentence, the referential phrases are listed. A given referential phrase is indicated by "R" together with its citation-numeral. Next to the citation of the referential, the rule of inference or paraphrase applied is noted by its name as are replacement (symbolized "Repl") operations, i.e., adjustments (see below). Notes to a given referential often follow with further commentary on the cross-reference. A number of sentences are prefaced (or: followed) by a discussion of alternative analyses or particular difficulties in the analysis given. These discussions sometimes cover instances of cross-reference which have been overlooked in the transcription. Commentary enclosed in square brackets indicates explicatory remarks on the text (or: immunological procedures) obtained through discussion with the immunologist-informants (much of this commentary occurs in the "Methods and Materials" section).

Rules of Consequence and Paraphrase - Replacement of referential-phrases is effected for the most part by repeated application of a small number of rules of con-

sequence and paraphrase. The most frequently invoked rules of consequence and paraphrase follow (others are mentioned in the notes to particular cross-references). Among the rules of consequence -

(1) "Detach" (for Detachment): This rule detaches the last of a string of sentences containing an anaphoric referential phrase. It may be symbolized as: $S_1 \cdot S_2 \cdot \ldots \cdot S_n(R) \longrightarrow S_n$, where '$\cdot$' indicates concatenation and '$S_i(R)$' a sentence containing a referential.

(2) "Detach for Epiphora": This rule detaches the first of a string of sentences containing an epiphoric referential phrase and can be symbolized as: $S_1(R) \cdot S_2 \cdot \ldots \cdot S_n \longrightarrow S_1$.

(3) "RelDetach" (for Detachment of Relative Clauses, i.e., secondary sentences): In a sentence of the form $S_1\ (X_1\ \underline{wh}\ (X_1)\ S_2\ (-X_1))$ where '$S_1\ (X_1)$' is a sentence containing an occurrence of a phrase X_1, '$\underline{wh}\ (X_1)$' is the appropriate $\underline{wh}$ - form of X_1 and '$S_2\ (-X_1)$' is a secondary sentence minus the phrase X_1 this rule detaches the secondary sentence S_2.

In the case of consequences obtained by means of general assumptions, the rules of consequence applied have not been described. Such a description would require an adequate account of the syntax (and semantics) of quantificational

phrases and "conditionals" (cf. chapter 1, section 10). These rules are referred to by names familiar in logic, e.g., "instantiation" and "modus ponens".

Only a few paraphrastic rules are regularly employed here. These include "I" for identity, Passive, and a number of permutations. Others are indicated in the notes.

Cross-references which involve an implicit classifier-sentence are indicated by an asterisk next to the name of the rule of consequence or paraphrase applied in the placement. The role of these classifier-sentences in replacements was noted in section 3.2.4 of the previous chapter.

Adjustments - The absence of any adjustment, i.e., simple substitution of the referend, is symbolized in the notes as "Subst". In others, a determiner a on a nominal phrase is rewritten the or the definite article is inserted before a particular nominal phrase. The referend is indicated in the notes by enclosing the appropriate number (subscripted in the transcription) within parenthses. Replacement of pro-forms such as there and here require insertion of an appropriate preposition, e.g., in, before the referend. For example, if in the transcribed text an occurence of serum serves as referend to a referential phrase there (numbered here as "5"), replacement of there is written: in + (5). The plus-sign ("+") is the symbol for concatenation.

A fair number of adjustments are written as functions applied to the referend phrase. The most frequently applied adjustments of this sort include the following.

Pl (for "Plural"), e.g., Pl (lymphnode) = lymphnodes

Poss (for "Possessive"), e.g., Poss (antibody) = antibody's

wh (for relative pronoun), e.g. wh (an animal) = which, wh (in serum) = where (Robbins 1968: 88-89, GEMP: 121-24 provide surveys of wh-proforms for phrases of differing grammatical categories), see below

Nom (for "nominalization"): Three types of nominalizations are distinguished.

Nom - written without a superscript - applies to a sentential(s) referend and yields: that S, e.g., Nom (lymphocytes contain antibody) = that lymphocytes contain antibody

Nom-ing (N V (Ω)) = N's Ving (Ω), where "N" is a nominal phrase, "V" a tensed verb, and "Ω" the complement of the verb, if it has one, e.g., Nom-ing (lymphocytes contain antibody) = (lymphocyte's containing antibody)

Nom_s (N V (Ω) = N's V_n (PΩ) or the V_n of N (PΩ), where "V_n" indicates the nominalized form of the verb and "P" a preposition, e.g., Nom_s (antigen was injected into an animal) = the injection of antigen into an animal. Inverses of the above nominalizations are referred to as DeNom (for "Denominalization").

Adjustments include passive and its inverse - depassive, the latter generally requiring reconstruction of an indefinite subject, e.g., DePassive (determinations were made) = someone made determinations, repetitional zeroing (cf. chapter 2, section 2.1 and GEMP 3.4), and less frequently applied operations mentioned in the notes.

The adjustment symbolized "Conj" (for "Conjunction") is a functor of two or more arguments. In the case of two arguments the arguments of the functor are simply conjoined under and, e.g., Conj (lymphocytes, plasma) = lymphocytes and plasma. In the case of more than two arguments the arguments are either conjoined under and or the "non-final" arguments are conjoined by comma and the "last" argument conjoined to these under and, e.g., for the latter possibility - Conj (lymph, lymphnode, serum) = lymph, lymphnode and serum.

Singled out for special consideration is a replacement operation which consists of several coordinated adjustments. The primary referend-component - a nominal phrase - is preceded by the (either by insertion of the definite article or rewriting the article preceding the component. The remainder of the sentence in which the component is contained is transformed into a secondary sentence, i.e. relative clause, on that phrase as in the following example:

(a) Antibody is present in lymphnodes. These lymphnodes are enlarged.

The components of the referend in the first sentence for the referential phrase these lymphnodes are: lymphnodes (= 1/3), in (= 2/3), antibody is present (= 3/3). The replacement of these lymphnodes is written as: the (1/3) + (2/3) + wh (1/3) + (2/3), i.e., the lymphnodes in which (= wh (these lymphnodes)) antibody is present. One can also consider the primary component of the referend in such cases to comprise the entire referend and the changes noted in the sentence containing that component an adjustment attendant upon replacement of that component (details associated with this replacement operation are discussed at length in chapters 3 and 4 of Robbins 1968).

Various adjustments can be composed as functions. For instance, "Conj (Pl (lymphocyte), Pl (tissue))" = Conj (lymphocytes, tissues) = lymphocytes and tissues. Mention should also be made of changes in the sentence containing a referential phrase upon replacement of the referential by its referend. These changes might be termed "accommodations". In some cross-references the verb is altered in number to agree with the number of the replacing subject, i.e., the referend replacing a subject referential phrase, e.g., was is altered to were upon replacement of its subject the lymphnodes by lymphnodes. In others the preposition which preceded the referential phrase is altered to another preposition, e.g., at is changed to on. Other, generally optional, "accommodations" include repetitionally-based zeroings. These alterations merit detailed consideration in further studies of this material.

2. ANALYSIS OF THE ARTICLE

INFLUENZAL ANTIBODIES IN LYMPHOCYTES OF RABBITS FOLLOWING THE LOCAL INJECTION OF VIRUS

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INTRODUCTION

193

1.1 In recent years, [A SERIES OF DEVELOPMENTS]$^{1'}_{a}$ has pointed to the role of the lymphatic system in the formation of antibodies. 1.2 (Early investigations (1-3))^{6,46} indicated that following (introduction of an antigen)$^{5\ 3/3}$ (into the tissues of)$^{5\ 2/3}$ (an animal)$^{5\ 1/3,48}$ <Assumption: Antigens are introduced into the tissue of an animal by injection of the antigen into an injection-site.> ⟨The antigen was introduced into the tissues of an animal by ((injection)$^{2\ 3/3}$ (into)$^{2\ 2/3}$ (an injection-site))$^{2\ 1/3\ 4}$⟩ antibodies could be found (in {the regional^{2} lymphnode}^{3}) the lymphnode regional to [THE site of injection]$^{2}_{a}$, often appearing [THERE]$^{3}_{a}$ earlier^{4} after [THE injection]$^{4}_{a}$ than in the^{5} blood-serum of [THE animal]$^{5}_{a}$. 1.3 More^{6} recently than [THESE]$^{6}_{a}$, [(TWO (series of studies))]$^{7}_{e}$ have been concerned$^{9\ 8,12}$ with the relation of the lymphatic system to the production of antibodies. 1.4 In one of [THESE]$^{8}_{a}$, ([THAT]$^{9}_{a}$ of

193

White and Dougherty), [IT][10] was shown (that preparations of
7 1/2

(the spleen and lymphnodes) [WHICH][11] are rich in lymphocytes
11 a

contained antibodies following subcutaneous injections of

antigen into mice (4, 5)). 1.5 In (the other[12] of [THE
10

series of studies])[12] Ehrich and Harris made use of the fact
7 2/2,37

that (the popliteal lymphnode) of the rabbit is the sole
13

node draining all tissue distal to [IT][13]. 1.6 (Cellular
a

antigens were injected into (the pad of (the rabbit)'s
14,16

hind-foot)), and (simultaneous studies) (were made of
35 22,39 17 1/2

extracts of (the[14] popliteal lymphnode) of [THE animal][14],
15,18,36

(the lymph of) the afferent and (efferent lymph-vessels of
19 1/2

[THAT node])[15] and the[16] blood-serum of [THE animal])[16].
a 19 2/2 a 17 2/2

1.7 [THESE investigations][17] showed (that [(THE lymph-
a

node)][18] and [THE efferent lymph][19] contained antibody in
23 a

[SUCH][20] concentration and [SO][21] soon after [THE injection
e e a

of antigen][22], (as to indicate clearly some role of [THE
a

lymphnodes][23] in the formation of antibodies (6))) .
20,21 34 1/3

1.8 On {further[24,25] analysis}- (analysis) [WHICH][24] extends
24 a

193

further than [THE analysis above][25'] (7), (lymph was separated

by centrifugation) (into) ((lymph-plasma) and (lympho-
27-28 3/3 27-28 2/3 28 1/3

cytes)). 1.9 Examination of [each of THESE][26] separately
27 1/3 26 a

showed (that ([THE lymphocytes)][27] contained) (antibody) in
a 30 31 2/2 31 1/2

higher concentration than [(THE lymph-supernate)][28])) .
a 32 29 34 2/3

1.10 Cross-absorption studies {further[29] pointed} - pointed

further than [THIS][29] to the fact (that [THE lymphocytes][30]
a a

had not absorbed [(THE antibodies)][31] from [THE lymph
a 33 a

plasma][32]) but were the primary site of [THESE substances].[33]
34 3/3

2.1 [THE immunological findings][34] were correlated
a

with histological changes taking place in {(the local[35]

lymphatic tissue)}- [THE lymphatic tissue local to [THE
41 a a

site of injection][35]][36]. 2.2 In other studies of [THIS
a

series][37] [IT][38] was shown (that macrophages did not, on
e

contact with antigens in vivo, produce antibodies (8)),
38

and the fate of particulate antigens was traced from (the

time) of [INJECTION][39] until [THAT][40] of the appearance[41]
40 a a

of antibodies in [THE tissue][41] (9).
a

193

3.1 Since [THE studies referred to above]$^{42'}_{a}$ involved the injection of (bacterial or cellular antigens and whole cells), interest was aroused as to whether {a similar$^{43}_{44}$ mechanism} - a mechanism similar to [THE mechanism above]$^{43'}_{a}$ might operate in the production of antibodies to {other^{44} antigens} - antigens other than [THESE]$^{44}_{a}$ [SUCH]$^{45}_{e}$ as (viral proteins)^{45} are. 3.2 [TWO of [THE earlier studies^{e} mentioned]^{a}]^{46}]^{47} had been concerned with the sequence of events following injection^{48} of active virus into [THE animal]^{a}]^{48}. 3.3 (McMaster and Kidd (2))$^{47\ 1/2}$ had demonstrated { (an antiviral principle)^{52} } - a principle against [THE virus]^{e}]^{49} in extracts of {regional^{50} lymphnodes} - lymph-nodes regional to [THE site of injection]$^{e}_{50}$ following the endermal injection of (active vaccine-virus)^{49,51,56} into (the ears of (rabbits)^{53,54}). 3.4 {The neutralizing^{51} principle} - [THE principle neutralizing [THE antigen]$^{a}_{51}$]$^{a}_{52}$ was found in higher concentration in (the^{53} lymphnode)^{57} of [THE animals]$^{a}_{53}$ than in the^{54} serum of [THE animals]$^{a}_{54}$ during the first

193

week of [THE experiment]$^{55'}_{a}$. 3.5 Evidence of multiplication of [THE virus introduced]$^{56}_{a}$ was found (in [THE lymphodes]$^{57}_{a}$) until the appearance$^{58}_{58}$ of antibody [THERE]^{58}. 3.6 (Burnet and Lush (3)$^{47\ 2/2}$), infected mice with virulent influenzal virus via the intranasal route and found antibody to influenzal virus in the mediastinal lymphnodes in 4 to 6 days^{59} after [THIS]$^{59'}_{a}$.

194

1.1 In the present study [IT]$^{60}_{e}$ was felt desirable (to investigate the development of antibodies to (a viral agent)^{61,62}, employing [THE agent]$^{61}_{a}$ as an antigen, with no possibility of multiplication of [THE virus]$^{62}_{a}$ in the tissues)^{60}. 1.2 {Accordingly^{63}} - in accord with [THIS]$^{63'}_{a}$, a study was undertaken of (the immunological response in (the rabbit)$^{64,65\ 75}$) to the injection^{64} of ((preparations of influenzal virus) into [THE animal]^{64}, inactivated by [THEIR]^{65} exposure$^{65}_{65}$ to ultraviolet rays), utilizing conditions similar to those prevailing in [THE experiments$^{67}_{a}$

194

quoted above with bacterial and particulate antigens (6-9)]$^{66'}$.

1.3 ([THE$_{a}$ preparations of inactivated influenzal virus]^{67} were injected into the foot-pad of [(THE$_{a}$ rabbit)]^{68}) and at various intervals {there^{69}after} - after [THAT$_{a}$]^{69} [THE$_{e}$ FOLLOWING materials]^{70} were collected^{71} from [THE$_{a}$ animal]^{71}: (lymph from the efferent lymphatic vessel of [(THE$_{a}$ popliteal lymphnode)]$^{72'}$, [THE$_{73}$ node itself]^{73} and heart-blood). 1.4 In one series of experiments, (((one type of influenzal virus)$_{70}$ was injected into one foot-pad)$_{76\ 1/2}$, and ((a heterologous type) was injected into the other foot-pad)$_{76\ 2/2}$). 1.5 [THIS]^{74} provided for a further control on the specificity^{76} of [THE$_{a}$ reaction^{77}]^{75} to [THE$_{a}$ injection of [THE$_{a}$ antigen]^{76}]^{77}.$_{77\ 2/2\ 74}$

METHODS AND MATERIALS

194

Preparation of Viruses. - 2.1 The preparations of (the PR8 strain of influenza A and the Lee strain of influenza B viruses) [1,3] were made by (inoculating (10-day)-old chick-embryos [6] with 0.2 ml of a 10^{-5} dilution of {the' respective seed-cultures} [5]) - the seed-cultures of [THE respective viruses][a][1]. [*][e][2]. (A preparation of [THE PR8 strain of influenza A virus and THE Lee strain of influenza B virus][a][3] were kindly supplied by Dr. Werner Henle). <Assumption: Chick-embryos grow in eggs> [2] <(10-day chick-embryos inoculated with 0.2 ml of a 10^{-5} dilution of the seed cultures grow in) (eggs).> 2.2 [(THE eggs)][a][4] [8,9] were [THEN][a][5] {further[6] incubated}- incubated further [THAT incubation][a][6] at 37 C for (48 hours)[7], after [WHICH][a][7] the[8] allantoic fluids [of [THEM][a][8]] were harvested[9] [from [THEM][a][9]] aseptically. 2.3 (The fluids to be used as vaccines) [12] were centrifuged from 20 minutes in a high-speed centrifuge, <Assumption: If fluids are centrifuged in a

centrifuge, then fluids are separated into a supernatant fluid and sediments> <(The fluids to be used as vaccines were separated 10-11 2/3) (into 10-11 2/3) (a supernatant fluid) 10 1/3 and (sediments) > [THE supernatant fluid][10] was discarded and 11 1/3 ([THE sediments][11]) resuspended in sterile buffered a 13 1/2 physiological saline solution in 1/10 of the[12] original volume) 13 2/2 of [THEM][12]. 2.4 ([(THE concentrated virus)][13]) 14,15 19½ (was inactivated by exposure[14] of [IT][14] to ultraviolet rays a for 10 minutes (10) 19 2/2). 2.5 (All preparations[15] of [THEM][15]) were tested for {their capacity[16]} - the a 16 capacity of [THEM][16] to agglutinate chicken-erythrocytes a and (those (vaccines) [WHICH][17] were used) had similar 17 a 18 titers. 2.6 Of [THESE vaccines][18], 0.2 ml was injected a into (the hind foot-pad of rabbits). 2.7 [(THE allantoic 25 a fluids injected with influenzal virus)][19] [WHICH][20] 20,21,26 a were to be used as antigen in serological tests were

194

dialyzed against 20 volumes of buffered saline in order to remove urates and to prevent formation of precipates on storage[21] of [THEM]$_a$[21] at 4 C.

3.1 (Injection of Rabbits) - [THE rabbits injected]$_{22\ a}$[22] were female albinos or chincillas weighing generally about 2000 g. 3.2 Prior to any injection, (each rabbit)[23] was bled from the[23] heart, (the serum)[24] collected[23] from [IT]$_a$[23] and preserved to be tested with later specimens[24] of [THE tissue]$_a$[24]. 3.3 [THE foot-pads of (the rabbits)]$_{28}$[25] were shaved and injected with 0.2 ml. of {the antigen-preparation[26]} - the preparation of [THE antigen]$_a$[26] and

〈Assumption: Injections are made with needles.〉 〈(The injection of the foot-pads of rabbits with 0.2 ml. of the antigen-preparation was made)$_{27\ 3/3}$ (with)$_{27\ 2/3}$ (a needle)$_{27\ 1/3}$〉 the point of entrance of [THE needle]$_a$[27] sealed with a drop of collodion. 3.4 After suitable periods of time [(THE$_a$

rabbit)]28 was anesthetized, the skin of the inner
29,34,35

aspect of the29 knee was incised, the29 semitendinosus and

semimembranosus muscles cut, and (the29 popliteal lymphnode)
30,32

of [THE animal]29 exposed. 3.5 (A ligature was placed
a

around (the30 efferent lymphatic vessel) of [THE tissue]30
31 a

and (lymph) (was collected31 from [IT]31 through a 27 gauge
36 1/2 a

needle into a syringe moistened with a solution of sodium

citrate)). 3.6 [(THE lymphnode)]32 was [THEN]33
36 2/2 33 41 a

excised34 from [THE animal]34 and (blood) (was collected
a 46 1/2

from the35 heart) of [THE animal].35
46 1/2 a

195

1.1 [(THE lymph)]36 was mixed well, enough37
a 37,38 1/2,39 1/2

of [IT]37 (was drawn off for a white-blood-cell count),
a 38 2/2

and the38 remainder of [IT] 38(was immediately centrifuged
a

to separate (cells) from (plasma)). 1.2 [EACH
40 1/2,48 40 2/2 89 2/2 a

part39 of [IT]39]40 was frozen and stored at - 10 C until
a

tested. 1.3 [(THE lymphnode)]41 was weighed and (was
a 42 1/2,43

195

ground in a mortar with equal volumes of "alundum" and

normal saline solution). 1.4 After [GRINDING][42], (sufficient saline was added) (to) make a 1:16 dilution of (the contents of [THE lymphnode]a)[43].

1.5 [THE ground suspension]a[44] was cleared by centrifugation,

<Assumption: The ground suspension is a fluid; Assumption 194.2.3> <(The ground suspension was separated) (into) (a supernatant fluid) and sediments> and ([THE supernate]a[45] was) removed, frozen, and (stored at -10 C) until tested.

1.6 Serum was prepared from [THE heart-blood]a[46] and similarly[47] to [THAT]a[47] stored at -10 C.

((Lymphocyte)-extracts) - 2.1 The volume of [(LYMPHOCYTES) obtained by centrifugation of (efferent lymph)]a[48] was (obtained by (an expression)[49] - [WHICH]a[49] is - (cell-volume = 0.0002 (T) (V) ml) [WHERE][50]

[T]a[51] equals the total {cell-count[52]}count of ([THE cells]a[52] of [(THE lymph)]a[53]) in thousands, and [V]a[54]

195

the volume of lymph collected. 2.2 [(THE expression)]$^{55}_{a\ 56}$ was derived in an easier study (7) and results obtained with [IT]$^{56}_{a}$ were correlated with volumes derived experimentally by hematocrit-determinations. 2.3 {Such total lymph-cell volumes} -(Volumes of total counts of [THE cells of [THE lymph]$^{57}_{a}$]$^{58}_{a}$) [WHICH]$^{59}_{59\ a}$ were [SUCH]$^{60}_{a}$ are shown in table I. <Assumptions: Lymph is a fluid, Lymph contains plasma and cells, Plasma is a fluid, Assumption 194.2.3, sentence 195.1.1.> <(The cells separated from lymph by centrifugation) are cell-sediment>^{65}. 2.4 In preparing [THE extract]$^{61}_{a}$, (a volume)^{62} of saline solution 127 times [THAT]$^{62}_{a}$ calculated for {the lymph-cells^{64}} - [THE cells of [THE lymph]$^{63'}_{a}$]$^{64'}$ was added to [((THE cell)-sediment)]$^{65}_{a}$, <(The saline solution)$^{66}_{139}$ is a suspending medium^{67}> and ([THE cells]$^{66}_{a}$) (were dispersed in [THE suspending medium]$^{67}_{a}$)$^{68\ 1/2,73}_{68\ 2/2}$. 2.5 [(THIS suspension)]$^{68}_{69}$ (was subjected to alternate freezing and thawing, at -70 C.

and 30 C. respectively, three times,) and [THE suspension][69] was [THEN][70] cleared of insoluble material by (centrifugation). 2.6 〈Assumptions: The suspension is a fluid, Assumption 194.2.3, sentence 195.2.5〉 〈(The suspension is separated) (into) (a supernatant fluid) and sediments〉 { The resulting[72] supernate } - [THE supernate][71] resulting from [IT][72] was used as 1:128 solution of the contents of [THE cells][73].

196

1.1 Technic of Antibody-determination. - [(TWO convenient methods)][74] were available to (test specimens for content of {influenzal[75]} antibodies) specific to [THE influenzal virus][75]'. 1.2 [BOTH methods][76] utilize the phenomenon of (agglutination of chicken-erythrocytes by allantoic fluids infected with influenzal virus) (11), and the corresponding inhibition of [THIS agglutination][77] by antibodies to influenzal virus. 1.3 (The original

196

method[78] to [DO THIS][78] described by Hirst and Pickles) (12)
a 74 1/2,80,88

involves (the use of (a photoelectrical cell to (measure (the

degree of sedimentation of (erythrocytes agglutinated by (in-

fluenzal virus)), and the inhibition of [THIS agglutina-
81,90,106 79 a

tion][79] in the presence of immune bodies)))). 1.4 (Salk
95 82 126 96

(13) and others have modified [THIS method][80]) so that the
a 74 2/2,83

pattern formed on the bottom of (a test tube) by the settling of
145

{agglutinated[81] erythrocytes} -(erythrocytes agglutinated

by [THE virus][81]) can be used for {similar[82] determina-
a 89

tions} - determinations similar to [THOSE determinations][82].
a

1.5 Because of ((the somewhat greater sensitivity), relative
86 1/2

ease and simplicity (of [(THE Salk modification)][83]))
a 84,87 86 2/2 85

[THIS technic][84] was used in very early experiments.
a

1.6 [IT][84.5] was found, {however[85]} - in spite of [THIS][85]
e a

that (([THE greater sensitivity of [(THE pattern-
a a

method)][87]][86]) held no advantage over [(THE Hirst technic)][88]
92 91 a 93

since the amount of {non-specific[90]} inhibition of

[AGGLUTINATION][89] not specific to [THE virus][90] by normal
a a

tissue-factors was {also} - similarly to [THIS][91] greater[93]
a

in [THE pattern-test][92]) than in [THE other test][93].
84.5,94,130 a

1.7 {Accordingly[94]} - In accord with [THIS][94], (all
a

determinations[85] of [THIS][95] were made by [THE method
a a

originally described by Hirst and Pickles (12)][96],) except
98

(in a few instances) [WHERE][97] the volume of material to be
97 a

tested was insufficient[98] to [DO THIS][98]. 1.8 (Serial
a

dilutions) of (extracts of lymphnode, blood-serum and
102

lymph) were made in steps of two. 1.9 All dilutions[99] of
99

[THEM][99] were begun at (1:16), as [IT][99.5] was found (that
a 100

serum and tissue-extracts of normal rabbits showed some

inhibition of [THE agglutination of chicken-erythrocytes][100]
a

in {lower[101] dilutions}) - dilutions lower than [THAT
99.5 a

dilution][101]. 1.10 (One half ml of a suitably diluted

antigen was added to 0.5 ml of each[102] dilution of [THE
a

dilutions][102] of extract of lymphnode, lymph, and serum,

196

respectively), and ([(THE mixture)]^{103} was incubated at
103 a 105

room-temperature for 10 minutes). 1.11 {Thereafter^{104}}-
104

After [THAT],^{104} 1 ml of a standardized 1.5 per cent
a

suspension of (fresh red blood cells) was (added^{105} to
110 1/2

[IT]^{105} by automatic pipet). 1.12 After 75 minutes at
a 110 1/2

room-temperature ((the degree of sedimentation of

{ agglutinated^{106} red blood-cells }) (red blood cells
107

agglutinated by [THE virus])^{106} was determined by use of
114

(a photoelectrical cell)) . 1.13 The^{107} endpoint of
149 112

measuring [THIS]^{107} was considered to be the last dilution
a

of serum showing inhibition of [AGGLUTINATION]^{108} to
a

[SUCH]^{109} an extent (thast between 50 and 63 per cent of
a

[THE red blood-cells]^{110} were left in suspension).
a 109

1.14 Although [IT]^{111} was possible (to render [(THE test)]^{112}
e a 115

quite sensitive by diminishing the concentration of virus

to be used), [IT]^{113} was found (that the inhibitory effects
111

of sera and tissue-extracts of normal animals (11,14,15)

196

on [THE agglutination by (influenzal virus)][114] were more
134,140

marked as [(THE test)][115] was made increasingly sensitive).
a 116 113

1.15 With 8 units of (virus), as was used in [(THE tests)][116],
117 a 120

({non-specific[117] reactions} - reactions not specific to [THE
a

virus][117'] were not given by lymphnode-extracts at a

dilution of (1:16) of greater). 1.16 {Accordingly[118]} -
119 118

In accord with [THAT][118], [THIS][119] was the minimal
a a

dilution employed in [(THE tests for antibodies)].[120]
a 121,123

1.17 In each[121] test of [THE tests][121] a number of specimens
a

from previous tests were repeated and standard anti-sera

were included, [SO][122] (that correlation could be made from
e

one test to the next)[123] of [THE tests].[123]
122 a

2.1 In the cae of [(THE lymphocytes)][124], (the
125,129,135

small volumes of {cell[125]-extracts} - extracts of [THE
a

cells][125] precluded the possibility of employing [(THE
a

sedimentation-test)][126]). 2.2 [IT][127] was found, {how-
151 128 e

ever[128]} - in spite of [THIS],[128] (that the antibody-titers

196

in the contents of [THE lymphocytes][129] were so high that

[(THE pattern-test)][130] could be employed, since (the
131,137

range of titers) involved in [THE test][131] was beyond
132,133 a

[THAT][132] at [WHICH][183] {non-specific[134]} interference of
a a

tissue-extracts and fluids not specific to [THE virus][134'
a

occurred). 2.3 Since the point at issue was whether [(THE
127

lymphocytes)][135] were richer in antibody the lymph-plasma
136

surrounding [THEM],[136] [THE pattern-test][137] was used only
a a

for (lymph-specimens) of [WHICH][138] [THE lymph-cell sediment][139]
138 a a

was sufficient for a microserological test.

197

1.1 (The pattern-test for lymph-specimens) was set
147,150

up by (adding 0.4 ml of [THE antigen][140] in suitable
a

dilution to 0.4 ml of serial dilutions of lymph).
141,142,165

1.2 After 10 minutes of incubation[141] of [IT][141] at room-
a

temperature (0.2 ml of (a 1 per cent suspension of cells)
144

was added[142] to [IT][142]), and [THE test][143] was incubated
143 a

197

at 4 C. until [(THE red cells)][144] had settled to the bottom
a 146

of [THE test-tubes][145]. 1.3 The inverse of the last
a

dilution of antibody-preparation showing complete inhibition

of agglutination of [THE red cells][146] by influenzal virus

was considered to be the titer. 1.4 In each[147] test of

[THE tests][147] antibody determinations were made on
a

(specimens) [THAT][148] had been previously tested by the use
148 a

of [THE photoelectrical densitometer][149]. 1.5 The ratio of

titers obtained in [(THE pattern-test)][150] to titers
a 153

obtained in [(THE sedimentative test)][151] enabled [US][152]
a 154 a

to transfer from [ONE system][153] to [THE other][154].
a a

2.1 For testing [THE lymphocyte-extract][155] (the
a

volumes of [(THE reagents)][156] were reduced tenfold, without
e 157

altering {the respective[157] concentrations or proportions}) [158,163,166]

- the concentrations or proportions of [THE respective
a

reagents][157]. 2.2 {Thus} - In accord with [THIS][158]
a

(the twofold dilutions of (cell-extract and [THE influenzal
a

197

virus])[159] (were present in 0.04 ml). 2.3 [ALL THESE
156 160 1/2,162 160 2/2, 162

quantities][160] were delivered from pipets graduated in

0.001 ml, and tubes of 10 mm diameter were employed.

2.4 [IT][161] was found (that [THE test][162] could be carried out
e a

by [THIS micro-method][163]), and [IT][164] was found (that the
161 e

titers of standard specimens, examined simultaneously by

[THE regular tests][165] and [THE micro-tests],[166] showed
a a

excellent agreement).
164

EXPERIMENTAL - PRELIMINARY OBSERVATIONS

197

3.1 In the first series of experiments undertaken, (a concentrate of (a commercially prepared vaccine of influenzal viruses of types A and B) was used).[1,5,12,21,25] [7,13,15,33]

3.2 [THIS preparation][a][1] consisted of (allantoic fluid infected with the PR8 and Weiss strains of type A and Lee strain of type B influenzal virus concentrated 200-fold by centrifugation) and inactivated by the addition to [IT][2] of 0.05 per cent formalin. 3.3 When [(THE popliteal lymphnodes)][a][3'] were excised[4] from [THE animals][4'] 3 days following [INJECTION[6] of [THE vaccine][a][5] into [THE animals][a][6']][7], gross examination[8] of [THEM][e][8] showed that [(THE nodes)][a][9] (were very large, hemorrhagic, and intensely swollen).[8] 3.4 [THE same gross picture][a][10] characterized the popliteal lymphnodes excised[11] from [THE animals][a][11'] on the 5th day following [INJECTION of [THE vaccine][a][12]][13]. 3.5 Of the (rabbits) included in the group[14] of [THEM][14] to be

197

sacrificed on the 5th and 8th days after [INJECTION][15], some were found to have develped sterile abscesses at (the site of injection) on [THE foot-pad][16]'. 3.6 ⟨(Popliteal lymphnodes) (were excised from rabbits on the 5th and 8th days following injection)⟩ Histological examination of [(THESE lymphnodes)][17] showed (severe destruction[18] of lymphocytes [THERE][18] and of the architecture of [THE nodes])[19]. 3.7 (Karyorrhexis was marked, with bits of nuclear contents replacing lymphocytes). 3.8 (Outlines of the follicular[20] architecture of [THE nodes][20] could barely be discerned). 3.9 In view of the experience gathered with (the lymphocytopenic effect) of influenzal virus preparations when injected intravenously into the rabbit (16), it was felt that perhaps {the toxic[21] effect on the local[22] lymphatic tissue} - [THE effect of [THE toxin][21] on - [THE lymphatic tissue local to [THE site of injection][22]][23]][24] was due to {this property of the particular viral agent

197

employed} - [THE particular viral agent employed][25]
a

having [THIS property][26]. 3.10 Despite [THE extensive
a a

damage to [(THE lymphnodes)][27]][28]', analysis of the
29,30

extracts[29] of [THE tissues][29] showed (antibody to influenzal
a

viras was present[30] [THERE][30]). 3.11 Similarly[31] to
a 31

[THIS],[31] the blood collected from the rabbits' hearts
a

- the hearts of [THE rabbits][32]' (contained antibody to
a

influenzal virus) whereas serum collected prior to

[INJECTION][33] showed no [REACTION][34].
a a

THE OPTIMAL CONCENTRATIONS OF ANTIGENS

198

1.1 ⟨Assumption: Experiments are undertaken in a laboratory⟩ {Further[1] experiments} - (Experiments further than [OTHER experiments][1'] were undertaken) ⟨(Experiments were undertaken) (in) (a laboratory)⟩ with preparations of [(THE PR8 strain of influenza type A)][2'] cultivated for [THE purpose][3] in [THIS laboratory][4]. 1.2 Various preparations of [IT][5] were injected into rabbits' (feet), ranging from 20-fold concentrations of (virus) to 10^{-4} dilution with respect to the concentration[6] of [IT][6] found in allantoic fluid. 1.3 (No demonstrable antibodies to influenzal virus were found in (lymphnodes) excised from (rabbits) [WHICH][7] had been injected with 0.2 ml of influenzal virus diluted to 10^{-4}). 1.4 {However}- In spite of [THIS][8], following the injection of allantoic fluid infected with influenzal virus, at a dilution of 1:100 or less, antibodies could be found in {the local[9] lymphatic

198

system} - [THE lymphatic system local to [THE site of
a a
injection]9]10. 1.5 (Undiluted (allantoic fluid) used as
13
antigen) produced (almost a maximal (antibody-response11)
35 12
in [THE serum]11') as compared with [THAT]12 to higher
a 36 a
concentrations of virus, whereas dilution of [THE allantoic
a
fluid]13 as antigen caused the appearance14 of progressively
smaller amounts of antibody in [THE serum]14'. 1.6 (Anti-
a
bodies to (influenzal virus) appeared in) [THE lymphnode]15
16 18 a
from two to four days after injection of [THE virus]16 into
a
into {the foot-pad} - the17 pad of [THE foot]17, whereas
a
normal lymphnodes or lymphnodes derived from rabbits in-
jected with typhoid or dysentery bacilli showed no
[REACTION with influenzal virus]18. 1.7 If ((antibodies to
a
influenzal virus) were detected (in [(THE serum)]19') at
21 a 24 22
about the same time as in [THE lymphnode]20) [THEY]21 were
a 23 a
generally found22 in lower concentration [THERE]22.
a
1.8 On {other23 occasions} - occasions other23 than

[THOSE occasions][23] (antibody to influenzal virus) was
a 25

found in [THE serum][24] 1 or 2 days after [ITS][25]
a a

appearance in [THE lymphnode][26]. 1.9 [(THE experiments)][27]'
a a 38

indicated that [IT][28] was desirable (to use an adequate,
e

but not overwhelming amount of virus in the vaccine).
28

1.10 (((A 10-fold concentrate) of ((allantoic fluids)
39 29

[WHICH][29] had been infected with influenzal virus) and
a 30

harvested after 48 hours of incubtion[30]) of [IT][30] seemed
32 a

to be the optimal type of vaccine), although {the resulting
37

antibody-titers} - the (antibody-titers)[31] in [THE serum][31]'
33,34 a

resulting[32] from [THE antigen][32] were not much greater than
a

[THOSE[33] of [THEM][33] [THAT][34] followed [THE injection of
a a a

allantoic fluid][35]][36]. 1.11 {Accordingly} - In accord
with [THIS][37], all {subsequent[38] experiments} - experi-
a

ments subsequent to [THE experiments][38] were conducted with
a

[THIS concentration][39] of influenzal virus.
a

SEQUENCES OF EVENTS FOLLOWING INJECTION OF THE VIRAL ANTIGENS

198

2.1 A series of experiments was undertaken using as antigen ((an inactivated preparation of [(THE PR8 strain of a influenzal virus)) [WHICH]^{1} had been concentrated 10 1,77 3 a times]$^{2'}$) as judged by the capacity of [THE vaccine]^{3} to 4,25 a agglutinate chickens' red cells. 2.2 ([THE antigen]^{4} was a injected into the foot-pads of a suitable number of (rabbits)) and at (1,2,3,4,5,7,9,10, and 15 days 8 5,12,14 after [INJECTION]^{5}), (lymph) (was collected from [THE a 38 10 1/2 a efferent lymph-vessels]$^{6'}$), ([THE popliteal lymphnode]$^{7'}$) 10 2/2 a 22 1/2 (was excised^{8}) from [THE animals]^{8} and (blood) (was 22 2/2 a 48 1/2 collected from [THE heart]$^{9'}$). 2.3 (Counts of the white 48 2/2 blood-cells contained in [(THE lymph collected)]^{10}) were a 11 16 found to range from 33,000 to 110,000 cells per mm^{3} ^{11} of [THE tissue]^{11}, in the period of [THE second to fourth day a after [INJECTION]^{12}]$^{13'}$. 2.4 (By [(THE 9th day^{14}) after a a 19 1/2 [INJECTION]^{14}]$^{15'}$), ([THE counts]^{16}) (were down to (10,000 20 3/4 a 20 1/4

198

to 15,000)) (and even somewhat lower[17] than [THIS][17]
17 20 2/4 a

by (the 16th day)[18]) after [INJECTION][18'].
19 2/2 20 4/4 a

2.5 [THE counts found in [THE later days][19]][20] resemble
a a

(those) [WHICH][21] had been found to be characteristic of
21 a

lymph collected from the efferent lymph-vessel of the

popliteal lymphnode in normal rabbits (6). 2.6 When

([(THE extracts of lymphnodes)][22] were tested) [IT][23]
a 24,29 49 1/2 e

was found (that antibody could not usually be detected[24]

[THERE][24] before ([THE second day following [INJECTION of
a a a

[THE antigen][25]][26']][27')). 2.7 On [THAT day][28],
a 28,30 23 a

antibody could generally be found (in [(THE extracts of
a

lymphnodes)][29]) in low titer. 2.8 In {subsequent[30]
35 31,32

days} days subsequent to [THAT day][30] the level of
a

antibody-titer rose[31] [THERE][31] and generally reached[32]
a

the peak [THERE][32] between [THE 5th and 7th day[33] after
a a

[INJECTION][33']][34']. 2.9 Frequently a fall in antibody-titer
a

of [THE extracts of lymphnodes][35] could be detected after
a

198

[THE 5th day][36]' or [THE 7th day][37]'. 2.10 (Analysis of [(THE lymph)[41,43] collected at [THE various intervals][38]][39]') [49] 2/2 { similarly[40] showed } showed similarly to [THIS][40]' no measurable amount[41] of antibody in [THE tissue][41] before [THE 2d day][42]', low titers[43] of (antibody)[46] in [THE tissue][43] on ([THE 2d day][44]' or [THE 3d day][45]'), and an increasing titer[46] of [IT][46] in { later[47] days } days later than [THOSE days][47]. 2.11 { Simultaneous[49] } tests with [(THE blood-serum)[50,52,57,62]][48] simultaneous with [THIS][49] showed that no measurable amount of (antibody was present[50])[53] usually in [THE tissue][50] before [THE 3d day][51]'.

2.12 [HERE][52] [AGAIN][55]', after [THE appearance of (antibodies)[54,56]][53] in low titer there was a continuous rise[54] in [THEM][54]. 2.13 {The serum-titer[56]} - The titer[56] of [THE antibodies][56] in [THE serum][57] in [(THE first 4 days)][58]' [59] almost always lagged behind (the antibody-titers of both [(THE lymphnodes and THE lymphs)[71,72]] of [THE corresponding

198

days]^{59}]$^{60'}$. 2.14 By [(THE 5th and THE 7th days)]$^{61'}$
a 64,66,68

(the (antibody)-content) of [(THE serum)]^{62} was greater
69 63 70

than [THAT]^{63} of either {the^{64,66} respective lymphnode or
a

the lymph} - [THE lymphnode of [THE respective days]^{64}]$^{65'}$
a a

or [THE lymph of [THE respective days]^{66}]$^{67'}$. 2.15 {There-
a a

after^{65}} After [THAT]^{68}, {the serum-titer^{68,70}}-the titer
a

of [THE antibodies]^{69} in [THE serum]^{70} remained higher^{71,72}
a a

than [THE titers of antibodies present in [THE other
a a

tissues]^{71}]^{72} for [THE duration of [THE experiments]$^{73'}$]$^{74'}$.
a a

2.16 [THESE quantitative relations]$^{75'}$ are shown (in

(fig. 1)), [WHICH]^{76} represents a summary of experiments
76 78 a

performed with [THE PR8 strain of influenzal virus, type A]^{77}.
a

2.17 The geometric mean antibody-titer was determined for

(an average) of (nine) (rabbit)s per interval represented^{78}
80 81 83

[THERE]^{78}. 2.18 In the case of [THE lymph]$^{79'}$, [THIS
a a a

number]^{80} of specimens was smaller^{81} than [THIS]^{81} because
a

[IT]^{82} was not in each [CASE]^{83} possible (to obtain a
e a

198

satisfactory specimen of lymph). 2.19 Analysis of the
82

results obtained from (rabbits [WHERE]$^{84'}$ lymph, extracts
a

of lymphnode and serum were obtained) showed that frequently
89

((the antibody-content) of lymph collected in [THE 2d to
86 a

4th days]$^{85'}$ was higher than [THAT]^{86} of [(THE lymphnode)
a a 96 1/2

or (THE serum) (collected in [(THE 2d to 4th
a 99 1/2 a

days)]$^{87'}$)]$^{88'}$). 2.20 In some [(ANIMALS)]^{89}
98 96-99 2/2 90,92,94 a 91,93

[THE differences]^{90} were quite marked, in others^{91} of
a

[THEM]^{91}, [THE differences]^{92} were small, and in some^{93} of
a a

[THEM]^{93}, [THIS difference]^{94} was not apparent. 2.21 In
a a

[ALL of THESE cases]$^{95'}$ (the antibody-titer) of [THE
a 97 a

lymphnode-extract]^{96} was higher than [THAT]^{97} of {the
a

corresponding^{98} serum} - [THE serum of [THE corresponding
a a

days]^{98}]^{99}. 2.22 In [(THOSE INSTANCES) [WHERE]^{100} ((the
a 100 a

titer) of lymph wsa not markedly higher than [THAT]^{101} of
101

[THE lymphnode]$^{102'}$]$^{103'}$) (the titer) of [THE extract of
a 105 106 a

198

lymphnode]$^{104'}$ was {nevertheless^{105}} - despite [THIS]$^{105}_{a}$ higher than [THAT]$^{106}_{a}$ of {the corresponding^{107} serum} - [THE serum of [THE corresponding days]$^{107'}$]$^{108'}$.

200

1.1 [THE range of individual variation among [THE$_{e}$ experimental animals]$^{109'}$]$^{110'}$ is illustrated in (table II).^{111}

1.2 On examination of [THIS table]$^{111}_{a}$ [IT]$^{112}_{e}$ is seen (that specimens^{113} of [THE tissues]$^{113}_{e}$ from rabbits 328, 317, and 341 (showed) greater (differences between the antibody-content of (lymph, lymphnode and serum)$^{114\ 1/2}$ than [DID]$^{114}_{a}$ the specimens^{115} of [THE tissues]$^{115}_{a}$ from rabbits 330 and 316).^{112} 1.3 Rabbit 340 illustrates (an instance) [WHERE]$^{116}_{a}$ antibody-content of lymph and lymphnode were similar, and in rabbit 214 (the titer of antibody)^{117} of lymphnode-extract was greater than [THAT]$^{117}_{a}$ of [THE lymph collected]$^{118'}_{a}$.

HISTOLOGICAL CHANGES IN THE LYMPHNODES

200

2.1 The weight of ([(THE popliteal lymphnodes)]$^{1'}_{a\ 6}$ increased progressively with time after [INJECTION]$^{2}_{a}$) from a normal of 0.2 g in the uninjected leg, (to)$_{3\ 2/3}$ (weights of 0.7 to 0.8 g).$_{3\ 1/3}$ 2.2 [THIS peak]$^{3}_{a}$ was attained at the 5th to 7th[4] day after [INJECTION]$^{4'}_{a}$, and {after 10 days} - 10 days after[5] [THE injection]$^{5'}_{a}$, the weight of [(THE lymphnodes)]$^{6}_{a\ 8}$ began to decline. 2.3 At about the 4th or 5th[7] day after [INJECTION]$^{7'}_{a}$, (the entire surface of [THE node]$^{8}_{a\ 10}$) showed very fine irregularities$_{9}$, [WHICH]$^{9}_{a}$ is the external evidence of follicular[10] structure within [THE lymphnode]$^{10}_{a}$.

3.1 Microscopically there was marked diffuse hyperplasia of lymphnoid tissue reaching a maximum two days after [THE injection]$^{11'}_{a}$. < Assumptions: Hyperplasia is of lymphocytes, Lymphocytes have size, If there is an abnormal increase of lymphocytes (hyperplasia) in a node and lymphocytes have size, then there is an enlargement of

the node〉 . 〈There is (an enlargement of the node)〉 .
12

3.2 [(THE enlargement of (the node))]12 was seen
13,18,20,36 19

to be due to swelling of (the13 cortex) of [THE lymphnode]13
15,25 a

with (great numbers of (large) and medium (lymphocytes)),
16 1/2 16 2/2 14

[WHICH]14 were not fitted into any units of organization.
a

3.3 Mitotic figures were often seen15 [THERE]15, and
a

transitional forms between reticulum-cells and [THE young
a

lymphocytes mentioned above]16. 3.4 On (the third17 day

after [INJECTION]17'), there was {further19 increase in
a 21

size} - increase in size19 of [THE tissue]18 further than
a

[THE previous increase]19 and a number of small lymphocytes
a

was seen20 [THERE]20. 3.5 On [THIS day]21 (there were
a a

beginnings of groupings of small lymphocytes) (into)
23 3/3 23 2/3

(circular areas). 3.6 On the fourth22 day after
23 1/3

[INJECTION]22' ([THESE areas]23 were clearly recognizable
a a

as) (secondary nodules), and by (the fifth24 day after
26 2/2 26 1/2

[INJECTION]24'), (the larger part of [(THE cortex)]25
a 28 a 27,33

200

consisted of [(THESE clearly defined nodules)][26]) and
29 31 1/3

(many of the[27] lymphocytes present [THERE][27] were of the
a

small type). 3.7 At ([THIS time][28]) (large lymphocytes,
31 2/3 a 30

some reticulum-cells and transitional forms were to be seen

at the centers of [(THE nodules)][29]). 3.8 {There-
34 31 3/3

after[30]} - After [THAT][30] [THE histological picture][31]
a a

remained fairly constant for a few days. 3.9 On (the ninth[32]

day after [INJECTION][32']) the nodular organization of
a 35

[THE cortex][33] had begun to lose definition. 3.10 [THE
a a

nodules][34] were increasingly indefinite on {succeeding[35]

days} - days succeeding [THAT day][35], and the size of
a

[THE node][36] diminished.
a

EXPERIMENTS INVOLVING DIFFERENT SEROLOGICAL TYPES OF THE VIRUS

200

4.1 [ANOTHER series of experiments][1'] was done to confirm the specificity[2] of [THE reaction[2] to [THE antigen][2']][3']. 4.2 ((Each[4] (rabbit)) of [THE rabbits][4'] received 0.2 ml. of (a (PR8) vaccine) in {(the[5] right foot-pad) of IT} - [ITS][5] right-foot-pad, and 0.2 ml. of (a (Lee) vaccine) in {(the[6] left foot-pad) of IT} - [ITS][6] left foot-pad). 4.3 [THESE strains][7] are respectively of type A and type B influenzal virus, and do not cross-react serologically. 4.4 After suitable intervals of time (the[8] lymph, (lymphnode) and (serum)) (were collected[8]) from [THE animals][8] and all (specimens)[9] of [THE tissues][9] were tested for [THEIR][10] antibody-content to both PR8 and Lee viruses. 4.5 In testing [THE specimens obtained][11] [IT][12] was found (that ([THE pattern of appearance of antibodies to [THE virus injected][13]][14]) was similar to [[THAT][15] described above][16']). 4.6 In [THE early days][17]

200

after [INJECTION]^{18} ((2 to 4 days)) antibodies were found
a 17

in {the right^{19} lymphnode} - the lymphnode on the side of

[THE right site of injection]^{19} against [PR8]^{20} exclusively,
a a

and in {the left^{21} node} - the node on the side of [THE
a

left site of injection]^{21} only against [LEE]^{22}. 4.7 ((The
a

antibody-titer) of [THE serum]^{23} lagged behind [THAT]^{24} of
24 a a

[THE lymphnode]^{25}) as had been [THE previous experience]$^{26'}$.
a 14 a

4.8 ⟨Assumption: A foot-pad is part of a leg⟩ ⟨Each

rabbit received 0.2 ml of a PR8 vaccine in the right foot-

pad of a leg, and 0.2 ml. of a Lee vaccine in the left

foot-pad of a leg⟩ . As (the titer of antibody) in [THE
30 a

serum]^{27} against [PR8]^{28} and [LEE]^{29} neared [ITS]^{30} peak
a a a

[IT]^{31} was found (that ((the lymphnode of [(THE right
e

leg)]$^{32'}$), [WHICH]^{33} had been injected with [PR8],^{34}
33 41 1/2 (42 1/2) a a

contained antibodies to [(LEE virus)]^{35} in low titer)).
a 42 1/2 36 31

4.9 Similarly^{36} to [THIS]^{36}, (the lymphnode of [(THE left
a

leg)]$^{37'}$) , [WHICH]^{38} had been injected with
38 41 2/2(42 2/2) a

200

[LEE virus][39], began to show antibodies to [(PR8 virus)][40]. 4.10 (The level of antibody found in [THE respective lymphnode extracts][41] against [THE heterologous virus][42] generally was about 10 to 15 per cent of the level of { serum-antibody }) - antibody in [THE serum][43]. 4.11 [THIS percentage][44] agrees well with the percentage of serum-antibody content to be found in various tissues of the body found by Freund (17). 4.12 Since [EACH[45] leg of [THE legs][45'][46'] had been injected with [AN antigen][47'] and each[48] (popliteal lymphnode) of [THE nodes][48'] (was the site of physiological activity above the normal level) [IT][49] might be expected (that the antibody circulating in [THE serum][50] would be fixed to a greater extent, perhaps in a [THE active lymphnode][51] than in another tissue not directly involved).

203

1.1 (Figs. 2 and 3) illustrate (two of [THE

203

experiments described above][52'). 1.2 The development of
64,65,67

(antibodies) to [THE homologous and heterologous viruses][53']
61 a

are traced[54] [THERE][54] for [THE lymphnodes][55'] and [THE
a a a

serum][56']. 1.3 As can be seen[57] [THERE][57], [THE general
a e

pattern)][58] is similar to [THAT][59] of earlier experiments.
59 a

1.4 A difference in the properties of the preparations of

antigen may be observed[60] [THERE][60] in that (the rise of
a

titers[61] of [THE antibody][61] in [ALL THE tissues
a a

examined][62'] is earlier[63] after [THE injection][63'] in one
a

experiment of [THE experiments][64] than in the other[65] of
a

[THE experiments][65]). 1.5 In spite of [THIS][66], within
a 66 a

each[67] experiment of [THE experiments][67], - {however[66]},
a

(antibody) is seen to have appeared in {the[68] local
10

lymphatic system} - [THE lymphatic system local to [THE
a a

site of injection][68']][69'] before [IT][70] was observed in
a

[THE serum][71]).
a 58

THE CONCENTRATION OF ANTIBODY IN LYMPH-CELLS AND PLASMA

203

2.1 For a finer analysis of the source of [THE
a
antibodies found]$^{1'}$, (([(THE lymph) collected from the
a 8
efferent lymphatic vessel of [THE popliteal lymph-
a
node]$^{2'}$]$^{3'}$) was separated by centrifugation)
4,11,15,20,30 14 3/3
(into) (lymph-cells and (lymph-plasma)), and [(EACH
14 2/3 14 1/3 5 a
fraction^{4}) of [IT]^{4}]^{5} was tested for [ITS]^{6} content of
a a
(antibody). 2.2 As was noted above, [(THE pattern form of
19
neutralization test against viral hemagglutins)]$^{7'}$ was
10
chosen here becuase of (the small volumes)^{8} of [THE tissue]^{8}
9 a
to [WHICH]^{9} [THIS test]^{10} could be adapted. 2.3 Since (a
a a
direct comparison between each lymph-cell sediment^{11} of
(specimen)^{5} of [THE tissue]^{11} and [ITS OWN]^{12} lymph-plasma)
12 a a 17
was the purpose of [THE experiment]$^{13'}$, ([THE plasma]^{14} of
a a
each specimen of [THE tissues]^{15} was tested in parallel with
a
[THE cells])$^{46'}$, in an exactly similar micro-test. 2.4 Since
a 21
in addition to [THIS]^{17} [IT]^{18} was - {also^{17}} of importance
a e

203

(to compare the titers[18] of [THE antibody][18†] of lymphocytic
a

extracts with titers[19] of [THE antibody][19] found generally
a

in this study), {parallel[21] tests of the lymph} - tests of
18

[THE lymph][20] in parallel with [OTHER tests][21] were done
a

involving the conventional volumes of reagents. 2.5 (Table

I) shows the data obtained in [THIS experiment][22'].
24,34,40 a

3.1 [IT][23] is seen[24] [THERE][24] that (((the titer of
e a

{antiviral antibodies[25]}) - antibodies against [THE
28 a

virus][25'] in the contents of [THE lymphocytes][26'] is in
a

[ALL CASES][27'] higher than [THAT][28] in [THE plasma][29'] of
a a a

the same specimen[30] of [THE tissue])[30]), and (that [THIS
a 23 1/2 31 a

difference][31] is greatest in [THE earlier days][32']).
23 2/2

3.2 In addition to [THIS][33'] [THE table][34] - {also[33]} gives
a a

{(the corresponding[36] total cell-counts of the lymph)} -
37

the total cell-counts of [THE lymph][35'] corresponding to
a

[THESE cases][36'], [WHICH][37] are fairly representative of the
a a

counts observed throughout this study. 3.3 In addition to

203

[THIS][38'] [IT][39] is - {also[38]} seen[40] [THERE][40]
a e a

(that ([THE reaction of {(the local[41] lymphatic system)[45]} -
e/a

[THE lymphatic system local to [THE site of in-
a a

jection][41'][42'][43], [BOTH][44] (in terms of (concentration[45]
a

of antibody) in [IT][45] and of (cell-count in efferent
43 1/2 a

lymph))) is not categorically different in [(ANIMALS)
43 2/2 44 48 a 46

[WHICH][46] received (2-fold concentrated) allantoic fluid][47']
a 49

from [THAT][48] in [ANIMALS injected with ten times [THAT
a a a

amount][49] of antigen][50']).
39

DISCUSSION

204

1.1 [THE data presented][1'] show that following (the
a

injection of (inactivated influenzal virus) into (the foot-
11

pad) of (rabbits)) there is a general burst of
2,3 18,22 16,17,23,26

activity of { (the local lymphatic system) } - the lymphatic
25

system local to [THE site of injection][2], characterized by
a

((a marked enlargement of (the sole draining lymphnode of

[THE area][3])) and an increase in the total number of
a 4,5,9,12 6

lymphocytes in the efferent lymph from [THAT node][4]).
a 10

1.2 [THE enlargement of [THE node][5]][6] is due to (lymphocytic
a a

hyperplasia) [WHICH][7] (is) at first (diffuse) and
7,8 1/3 a 8 2/3 8 3/3

[THEN][8] becomes organized into the[9] characteristic
a

follicular structure of [THE node][9]. 1.3 At the same[10]
a

time as [THIS][10] (antibodies to [THE viral protein
a a

injected][11] appear) (in the substance of) [(THE lymph-
13 3/3 13 2/3 a

node)][12] and in (the lymph emerging from [THAT node][13]).
13 1/3, 14 1/2 a 14 2/2

1.4 [THE antibodies in [THESE tissues][14]][15'] are frequently
a a

204

found earlier[16] after [THE injection]$_a$[16], and, in early days[17] after [THE injection]$_a$[17], in higher concentration than in the[18] blood-serum of [THE animal]$_a$[18]. 1.5 ⟨Assumption 200, 4.8⟩ ⟨(Inactivated influenzal virus was injected) (into the foot-pad of)$_{20\ 2/3}$ (a leg of rabbits)$_{20\ 1/3}$⟩ No antibodies to influenzal virus were found under the condition of [THESE serological tests]$_a$[19] in lymphnodes opposite to [THE leg injected]$_a$[20], lymphnodes of unmanipulated rabbits, lymphnodes derived from (rabbits)$_{21}$ [WHICH]$_a$[21] had received antigens other than influenzal virus and sera taken[22] from [THE animals]$_a$[22] prior to [INJECTION with influenzal virus]$_a$[23]. 1.6 [THE set of observations]$_a$[24] extends findings made previously in [THE same system]$_a$[25] with bacterial and other cellular agents (4-7). 1.7 [THE use of (influenzal virus)$_{27}$ inactivated beyond the range of infectivity]$_a$[26] eliminates the question of multiplication of [THE agent]$_a$[27] and provides data for a representative of [ANOTHER group of proteins]$_e$[28], (those of

viral agents).
28

2.1 A number of the observations made (in (this study)) agree with those made earlier[29] than [THIS][29]
29 34

by (McMaster and Kidd) [WHO][30] used active vaccine-virus
30,31

and employed another system of lymphatic tissue, also in the rabbit. 2.2 Similarly[31] to [THEM][31] Burnet and Lush
a

were able to demonstrate {neutralizing[32] antibodies} - antibodies neutralizing [THE antigen][32] in mediastinal
e

lymphnodes of mice infected with (influenzal virus).
32

3.1 (The antibody-titers[33] in [THE tissues][33'])
35,37,48

reported [HERE][34] have primarily a relatively significance,
a

since [THEIR][35] measurement is used to point to the primary
a

site or source of [THE antibodies found][36'] 3.2 [THE actual
a a

titers][37] could have been varied at will, by altering the (number of units of virus) against [WHICH][38] [(THE
38 a a

neutralization-tests)][39'] (were performed). 3.3 The amount
41,47 1/2 47 2/2

of (virus) was fixed, as was the lower limit of dilutions of
43

204

specimens[40] of [THE tissues]$_a$[40'] employed in [THE tests]$_a$[41], [SO][42] (as to preclude on a quantitative basis any {non-specific[43] reaction[43]}$_e$ - reaction not specific to [THE antigen]$_a$[43]). 3.4 (In the presence of 8 units of (virus)[44,45,49] a 1:16 dilution of serum, lymph or lymphnode-extract was found to be above the limits of {non-specific[44] interference} - interference not specific to [THE antigen]$_a$[44] by normal tissues or those stimulated by {other[45] antigens}[50] - antigens other than [THIS antigen]$_a$[45], [SO][46'] that in [THE tests as reported]$_a$[47] each[48] titer of [THE titers]$_a$[48] can be accepted without reservation as a {specific[49]-antibody titer} - antibody titer specific to [THE antigen]$_a$[49]. 4.1 {Further[50] evidence of specificity}$_e$ - [EVIDENCE of specificity extending further than [THE evidence of specificity above]$_a$[50]][51] was afforded by the (experiments) in [WHICH][52] (opposite legs of each rabbit received injections of different serological types of

204

influenzal virus). 4.2 The (differences in titers of [THE
64,67 a
antibody]53' in [THE tissues]54' to [THE homologous virus]55'
a a
and [THE heterologous virus]56') (are clearly marked) and
a 51 1/2 51 2/2
in relation to the existing titer57 of [THE antibody]57'
in [(THE serum)]58' to [THAT antigen]59, the concentration61
a 74 e
of {heterologous60 antibody} - antibody to [(THE
a
heterologous virus)]60 in [THE tissues]61' is quite in
59 a
accordance with what would be expected as a result of
Freund's investigations on the distribution of serum-
antibodies in the tissues. 4.3 In fact [IT]62 may be noted,
e
in following {the homologous63 antibody-titers of extracts
of a given lymphnode} - the antibody-titers of (extracts
of a given lymphnode) to [THE homologous virus]63'
66,68,73 a
through successive days64 after [THE injection]64, (that
a
the mean titers65 of [THE antibody]65' begin to decline66
a
[THERE]66 toward (the end of the first week67 after [THE
a a
injection]67), only (to increase68 [THERE]68 [AGAIN]69' in
70 a a

204

a measure {thereafter[70]}[62 72] - after [a THAT][70]. 4.4 [e IT][71]

may well be (that [a THE later rise][72] represents a summation

of the declining rate of antibody-production within [a THE

node itself][73] plus an increasing rate of concentration of

antibody from [a THE serum][74]). 4.5 (The demonstration of

antibodies in higher titer in {the local[75] lymphatic

system} - [a THE lymphatic system local to [a THE site of

injection][75'][76'] than in [a THE serum][77'], in the early days

of antibody production, is not a necessary condition for the

demonstration of antibody-production by [a THE lymphatic

tissue])[73'][80 3/3] (for) [80 2/3 (e TWO reasons)][80 1/3][79]. 4.6 {First,[80]}

The first of [a THEM][80] is: (the concentration of (a

substance)[81,83] at a given time need not be higher at a site

of [a ITS][81] production[81] than in (a reservoir)[82] into [a WHICH][82]

[a IT][83] is being drained). 4.7 {Second[84],}[79 1/2] - The second

of [a THEM][84'] is: (unless the amount of (antigen)[86 1/2] (injected)[86 2/2]

is quite small there is very probably antibody-formation

204

in lymphnodes proximal to [THE popliteal)]$^{85'}$ as a result of
a 87

{ antigen-specific^{86} soluble material} - soluble material

specific to [THE antigen]^{86} passing through [THE popliteal
a a

node])^{87} (9). 4.8 Under [THESE circumstances]$^{88'}$ (the
79 2/2 a

finding of antibodies earlier^{89} after [THE injection]$^{89'}$
a

and in higher concentration in { the local^{90} lymphatic

system } - [THE lymphatic system local to [THE site of
a a

injection]$^{90'}$]$^{91'}$ than in [(THE serum)]$^{92'}$) is particularly
a 95,97 99

significant. 4.9 [IT]^{93} should be noted (that in the case of
e

(the experiment summarized in fig. 1) (both legs were in-
98

jected with the same antigen), [SO]^{94} that [THE serum]^{95}
94 a

was receiving antibody simultaneously from [TWO sources of

supply])$^{96'}$. 4.10 [THE greater antibody-titer in lymph and
43 a

lympnode-extract than in [THE serum]^{97} in the early days of

[THIS experiment]^{96}]^{99} has, [THEN]$^{100'}$, even a greater
a a

significance as to [THE lymphatic source]$^{101'}$ of [THE
a a

antibodies found]$^{102'}$.

205

1.1 The concluding proof of the formation of anti-

body to viral protein in [THE lymphatic system][103'] is
a

[THE evidence for [THE lymphocyte itself][104'] as a primary
e

source of [(THE antibody)][105'][106']. 1.2 (The titers[107] of
107,109,117,121

[THE antibody],[107] (in contents of (lymphocytes)))
a 112,132 110 133

was found to be as high as) (8192), and ever [THIS
108 2/2 108 1/2 a

observed value][108] is probably not as high as the true

titer[109] of [THE antibody][109] present[110] [THERE][110], since
a

the (volumes) on [WHICH][111] calculations of volume[112] of
111 a

[IT][112] were based were derived from (a graph) [WHICH][113]
a 113,114

agreed closely with [ONE][114] based on hematocrit-readings of
a

packet-cells. 1.3 Inasmuch as (packed cells) (contain
115,116 1/2

interstitial fluid caught among [THEM][115]) (the true
a 116 2/2

volume of lymphocytes is certainly lower than {the packed-

cell volume[116]} - the volume of [THE packed cells][116],
a

and the true titer[117] of [THE antibody][117] of lymphocyte-
a

contents is {correspondingly[118] higher}) - higher
119

205

corresponding to [THAT extent]$^{118'}$. 1.4 In spite of
a

[THIS]^{119} even [THE values recorded]$^{120'}$, - {however^{119}},
a a

show a ratio of as much as 16 to the titer^{121} of [THE
a

antibody]^{121} of ((lymph) - plasma) of the same specimens^{122}
122 135

of [THAT tissue]^{122}. 1.5 [IT]^{123} is considered of additional
a e

significance (that [THIS ratio]$^{124'}$ is greatest at (the
a

time of the greatest rate of increase of antibody in [THE
a

lymphatic system])$^{125'}$), for [IT]^{126} would be logical (to
127 123 e

expect, at [THAT time]^{127}, the greatest ratio between (the
a

concentration of (antibody)) in [ITS]^{128} primary
128,130 129

source and [THAT]^{129} in [ITS]^{130} secondary site). 1.6 No
a 126

repetition was undertaken [HERE]$^{131'}$ of (the demonstration
a

that [THE antibodies in [(the lymphocytes)]^{132}]^{133} were not,
a 134

in all probability, concentrated in some way by [THOSE
a

cells]^{134} from [THE lymph-plasma])^{135}, since [THIS rather
a 136 a

laborious demonstration]^{136} had comprised the major portion

of a previous communication (7).

SUMMARY

205 2.1 Following (the injection of (inactivated influenzial virus) into (the foot-pad) of (the rabbit)), ((antibodies to [THE viral protein])[1] (can be found in (the popliteal lymphnode) of [THE animal][2], [WHICH][3] drains [THE site of injection][4], and in (lymph obtained from the efferent lymphatic vessel of [THAT node])[5]). 2.2 [THESE antibodies][6] are found earlier after [THE injection][7] in {the local[8] lymphatic system} - [THE lymphatic system local to [THE site of injection][8]][9] than in [(THE serum)][10]' and in higher titer until (the 4th day after [THE injection])[11]. 2.3 {Thereafter} - After [THAT][12] {the serum-titer} - (the titer of [THE antibody])[13]' in [THE serum][14] rises above [THAT][15] in [THE lymphatic tissues][16]'.

206

1.1 At the same time as [THIS][17] there is [A BURST OF ACTIVITY in {the local[18] lymphatic tissue} - [THE

lymphatic tissue local to [THE site of injection]^{18}]^{19}]^{20}.
a

1.2 There is ((marked enlargement of [(THE lymphnode)]^{21}),
a 19 22

almost entirely of cortical tissue). [THIS]^{22} consists of
20 1/2

diffuse (lymphocytic hyperplasia) [WHICH]^{23} very soon be-
23 a

comes organized into the conventional follicular structure

of lymphnodes. 1.4 (The absolute and relative count of

lymphocytes in the lymph emerging from [(THE popliteal
a

lymphnode)]^{24} rises sharply).
28 20 2/2

2.1 Injection of (serologically distinct strains of

influenzal virus) into the two legs of individual rabbits
27

give (results) [WHICH]^{25} corroborate the specificity of
25 a

[THE antibodies produced]$^{26'}$ to [THE antigen]^{27}.
a a

3.1 On separation of lymph emerging from [THE

popliteal lymphnode]^{28} into ((cells) and (plasma))
30 1/2 30 2/2 29

and testing [EACH^{29} of [THEM]^{29}]^{30} for antibody-content,

[IT]^{31} is found (that ((the titer of antibody) in [THE
e 33 a

lymph-cells]$^{32'}$ exceeds [THAT]^{33} in [THE lymph-plasma]$^{34'}$)
a a 35 4/4

(by) (ratio)s as high as (16:1)). 3.2 [THIS ratio][35]
34 3/4 35 1/4 35 2/4 31 a

is found to be highest (at the time) [WHEN][36] the rate of
36

increase of antibody-content of {the local[37] lymphatic

system} - [THE lymphatic system local to [THE site of
a a

injection][37]][38]' is greatest.

4.1 [THESE findings][39]' are interpreted to mean (that
a

the lymphocyte (can be a primary source, or site of final

synthesis), of antibodies to viral protein). 4.2 [THIS
42 40 a

conclusion][40] is in keeping with those of (earlier studies)
41

in [WHICH][41] [A SIMILAR role][42] was demonstrated for the
a a

lymphocyte in the formation of antibodies to bacterial and

cellular antigens.

ACKNOWLEDGEMENT

206

5.1 [WE][1]' wish to thank Mrs. Ruth L. Nagle and
a

Mrs. Miriam B. Farber for the collection of lymph-specimens.

NOTES TO CHAPTER 4

INTRODUCTION

193.1.1

R1: The epiphoric referential classifier a series of developments poses several difficulties in respect to (i) determination of the referend, (ii) the division between metascientific material (M) and science-language sentences, and (iii) replacement of the referential. Both series and developments appear to be referential, the former to certain phrases in M-segments in the paragraph, the latter to particular science-language sentences. Considering series first, included in its referend is early investigations (1-3) in 193.1.2. There is an apparent incongruity between in recent years in 193.1.1 and early. However the referend of the zero-referential introduced by more recently in 1.3 is early investigations (1-3): resolution of this referential (R6) allows us to conclude that early investigations are recent, dispelling the "incongruity". (If the referend of R6 were R1, then R1 would - in respect to series at least - refer only to early investigations (1-3). However this phrase alone is questionably classified by a series (of) developments): early investigations are a series (of developments)). The second referend component is itself an epiphoric referential phrase -in (1.3) two series of studies (R7) and R1 might be regarded as "inheriting" the referends of R7 (see discussion of R7 below). R7 is preceded by the phrase more recently: it may be considered then that R1 a series of developments is referential to early investigations (1-3) as its first component and to two series of studies as its second; development is thus construed as pertaining to a development over time. If so, under the Detachment* rule for Epiphora, a series of developments is replaced by the components noted (each component may have the remainder of the sentence in which it occurs appended as a secondary sentence, chapter 1, section 8.1). With conjunction of the components and an alteration of has in 1.1 to agree in number with the replaced subject (to have), one obtains... Early investigations (1-3) which indicated that following...and two series of studies which have been concerned with...have pointed to the role...antibodies.

A complication is introduced by noting that developments may refer to particular science-language portions of the paragraph. This is supported by the following considerations: (a) R1 is the subject of has pointed to, which has an "inferential sense"; the role of the lymphatic system in the formation of antibodies can be considered a "conclusion" drawn from certain science-language sentences (it is thus, epiphoric, though not clearly referential to such sentences). (b) The following science-language sentences of this paragraph can each be classified by development

(from 1.2) that following introduction of an antigen... antibodies could be found in the regional lympnode... the blood-serum (is a development)
(from 1.4) that preparations of the spleen and lympnodes contained antibodies...mice (is a development)
(from 1.7) that the lympnode.....antigen (perhaps with as to indicate clearly some role of...antibodies)
(from 1.9) that the lymphocytes contained antibody in higher concentration than the lymph-supernate
(from 1.10) that the lymphocytes had not absorbed...but were the primary site of these substances.

These segments might, independently of the preceding discussion, be taken to comprise the referend of R1 (a series is thus considered as pertaining to their conjunction). The rule of inference applied and the adjustments (Conj; change of has to have) are as above. A problem in this resolution is posed by the fact that a number of phrases in the segment listed are themselves referential and require resolution prior to replacement of R1. Another difficulty is presented by the length of the putative referend; replacement would yield a rather ungainly sentence.

Though the candidate referends of R1 have been presented as alternative resolutions of R1, the considerations noted above suggest that M-segments and science-language sentences be coordinated in some fashion in replacement of the referential (R1 apparently cannot be readily factored into a referential pertaining to M-phrases and another referential to science-language segments). The precise statement of this replacement is left as an outstanding problem. See chapter 5, section 4 for a discussion of epiphora.

In 1.1, the lymphatic system could be considered as referential to some phrase in an implicit sentence or as epiphoric to lymphnodes in 1.7 (cf. role in 1.1 and 1.7 and its occurrence in "conclusion"-like segments).

193.1.2

R2: Resolution of the zero-referential introduced by regional (chapter 3, section 3.23) requires an inference from the assumption given and an antigen was introduced into the tissues of an animal (a denominalization of the sentence which succeeds following in 1.2). The conclusion in which the referend occurs is obtained by instantiation and 'modus ponens'. Replacement under Detach = the (2 1/3 + wh (2 1/3) 2 3/3 was made (effected). On reconstruction of an appropriate preverb (make, effect) on the nominalization injection (by making an injection of the antigen....), see GEMP, 6.56 and Gross 1979: fn .6, 865-66.
R3: I, Subst.
R4: The referend of R4 is obtained from the inference noted

in R2. Under I, Repl = Subst.
R5: I, Repl = (the 5 1/3) + 5 2/3 + wh (5 1/3) + 5 3/3 was made/effected (The third component, alternatively, could be denominalized as: an antigen was introduced without need for reconstruction of the preverb, e.g. make). The comparative earlier is not expanded in 1.2. (See FIS, chapter 5 section 4.2 which discusses the connection of modifiers such as earlier to an injection sentence).

193.1.3

R6: The choice of the zero-referential is not clear, though the comparison with two series of studies, suggests these (as opposed to this: if this is chosen as the referential, the referend would be taken as all of 1.2; see discussion of R1 above for considerations favoring the referend given). Detach, Repl = the + (6).
R7: The referential-relationship between R7 and its referend exemplifies a common pattern of epiphoric cross-reference (at least in written discourses). Two in R7 indicates that the referend has two components in its referend; each of the components - that of White and Dougherty (in 1.4) and the other series of studies (in 1.5) contains phrases anaphoric to R7 (chapter 5, section 4). The anaphoric reference (at least of that in 1.4, R9) requires resolution prior to replacement of R7. The first component is resolved as: the series of studies of White and Dougherty; in both components the can be altered to a(n), e.g., in the second component - another series of studies. Under Detach (for Epiphora), these components are conjoined: Conj (7 1/2, 7 2/2) = a series of studies of White and Dougherty and another series of studies (To the second component, one might adjoin of Ehrich and Harris).

As with the role of the lymphatic system... in 1.1, the relation of the lymphatic system to the production of antibodies in 1.4 can be construed as epiphoric (though not clearly referential) to science-language segments of the succeeding sentences - see R1 discussion. The lymphatic system might accordingly be construed as an epiphoric referential classifier to various tissue - terms (perhaps only lymphnodes) and to lymphocytes in these segments.

193.1.4

R8: R8 is introduced by one of indicating the referend as R7. Detach, Repl = the + (8); the remainder of the sentence in which the referend occurs may be appended as a secondary sentence, i.e., as which have been concerned with... antibodies.
R9: The referend is given as series of studies in 1.3 though it could also be taken as series of studies upon the replacement of R8. Assuming the former, Repl (under Detach) = the + (9). Given this replacement, one of these in 1.4 can be regarded as an epiphoric referential to the

phrase in apposition to it.
R10: Under a paraphrastic transformation permuting the PN phrase (along with the appositive clause) to the end of the sentence, Repl = Subst.
R11: R11 is reconstructed to indicate resolution of the ambiguity in 1.4 - in one reading, only lymphnodes are rich in lymphocytes; in the other both tissues are. Resolution however requires a judgment of the informants (this may be avoided by use of a general sentence; e.g., Spleen contains lymphocytes). RelDetach, Subst.

193.1.5

R12: Other in the other series of studies does not introduce the zero-referential than the other series of studies but instead may be considered as contrasting with the phrase indicating the other member of the two-member set, i.e., the first component of R7. Other, like each in some of its occurrences (GEMP: 136) introduces a zero- "set" referential which can be noted as the series of studies (R12) Under Detach, Repl = the + (12) cf. chapter 3, section 3.1 on the analysis of other.
R13: It indicates the referend as the popliteal lymphnode (if itself occurred, the referend is the sole node in the same "clause", see Lees and Klima 1963, GEMP: 3.34 for the considerations here).
In 1.5 the rabbit has a generic occurrence of the definite article; the in the sole node is related to the identity stated.

193.1.6

R14: In 1.6, the popliteal lymphnode does not appear to be referential to the preceding occurrence in 1.5, presumably as the in the prior occurrence is "generic". I*, Subst.
R15: I, Subst.
R16: I*, Subst.
Simultaneous in simultaneous studies is not an announcer: studies were made at the same time.

193.1.7

R17: Under Detach, Repl = the + 17 1/2 + wh (17 1/2) + 17 2/2.
The referends of R18, R19 occur in 1.6 which assists in determining the referend of R17 (investigations is not clearly a classifier of studies but rather a local synonym).
R18: Detach, Subst.
R19: The in 1.7 is taken to distribute over and. The referend is a discontiguous phrase in 1.6. Under Detach, Repl = 19 1/2 + 19 2/2.
R20; R21: The exact replacement for R20-21 is not clear: the referend indicated can be taken as the complement of an appropriate: degree, extent, e.g., concentration to a degree and soon (or: early) to an extent as to indicate clearly...

antibodies (6)) (under I).
R22: Detach, Subst.
R23: I, Subst. The phrase given as R23 is not clearly referential inasmuch as the clause in which it occurs may be a general conclusion drawn from preceding science-language segments (note: the absence of agreement in number between "referential" and "referend").

193.1.8

R24, 25: Both R24 and R25 are taken as introduced by further (extends is an appropriate verb); analysis does not indicate clearly an appropriate zero-referential: it could be of the problem, of the tissues, etc. Repl (under RelDetach) for R24 = an + (24). Repl (under Detach) for R25 is as in R17 above. In 1.8, centrifugation can announce a zero-referential: of it with it anaphoric to lymph. (I, Repl = the (lymph).

193.1.9

R26: Detach, Subst. each of these is, more accurately, referential to lymph-plasma, lymphocytes with Repl = conjunction of the two components. If separately in 1.9 is deleted, there is separate replacement of each component in the sentence containing R26 and conjunction of the resultants. R27-28 below indicate that these does not refer to lymphocytes.
R27: Detach, Repl = the + 27 1/3 + 27 2/3 + wh (27 1/3) + 27 3/3.
R28: Detach, Repl = the + 28 1/3 + 28 2/3 + wh (28 1/3) + 28 3/3. (R28 shares the second and third components of its referend with R27) Lymph-supernate is synonymous with lymph-plasma (chapter 2 section 3.3)

193.1.10

R29: Detach. Repl = Subst (or: Nom-ing (29))
R30: Detach, Subst. The proximate referend, itself a referential (R27) is noted. Further replacements are possible.
R31: Detach. Repl = the + 31 1/2 + wh (31 1/2) + 31 2/2
[Note that antibody is used as a "mass" noun in 1.9 and as a count noun in R31: in the reports analyzed in FIS, no counts are made of individual antibody molecules].
R32: Detach. Subst (cf. R30)
R33: I*, Subst.
[Primary site (= "where first found") is taken as equivalent to "produce" in this and other articles analyzed in FIS. An inference is thus made requiring a number of implicit sentences: e.g., antibody is not present in significant amounts prior to injection, there is no action at a distance. Loosely, the argument is: if antibodies are found in lymphocytes and did not come from another source, then lymphocytes

produce antibodies. Cross-absorption studies are experiments involving 2 kinds of antibodies. The antibodies found in the lymphocytes of lymph could be there as a result of either 1) having been produced in those cells or 2) the lymphocytes could have "taken up" absorbed antibody in lymph-plasma. If one experimentally places lymphocytes in lymph-plasma together with a known amount and type of a given antibody, one can test those lymphocytes for the antibody. If antibody is found, clearly the lymphocytes "absorbed" the antibody from the plasma. If antibody is not found, one can conclude that lymphocytes do not absorb the antibody. If, therefore, antibody is found in the lymphocytes, it is likely that it was produced there.]

193.2.1

R34: The referend is determined by noting that (a) the components are in the Ehrich and Harris series (cf. 2.2 in other studies of this series), (b) immunological in R34 pertains to words in the "A" word-class, as noted in FIS, chapter 5 section 9. The components are: (that) the lymphnode and efferent lymph....antibodies (from 1.7), (that) the lymphocytes contained antibody...lymph-supernate (from 1.9), and the lymphocytes had not absorbed...lymph-plasma (from 1.10) - (the third component may be taken to include but...substances though, as the note above indicates, this involves an inference), each of which is classified by (an) immunological finding. The rule of inference is Detach*. Replacement is either by (a) taking each component, conjoined under and as a complement of R34, e.g. the immunological findings that the lymphnode and efferent lymph ...antibodies and (that)... or by (b) rewriting the as that which (chapter 1, section 8.4): the immunological findings = that which are immunological findings, and replacing that by a conjunction of the components under and.
R35: Detach*, Subst.
R36: Detach, Subst. The referend is given as the popliteal lymphnode, here synonymous to (or: classified by) the local lymphatic tissue (cf. sentence 193.1.6 and the discussion in chapter 3, section 3.23).

193.2.2

R37: Detach, Subst. The resulting phrase is awkward as the referend itself contains an anaphora. The referend alternatively could be taken as a discontiguous phrase - the... series of studies with of Ehrich and Harris as an adjunct.
R38: Under a paraphrastic transformation permuting the initial PN phrase to the end of the first conjunct, Repl = Subst.
R39: Detach, Repl = Noms (39) = injection of cellular antigens into the pad of the rabbit's hind foot.
R40: I, Subst.
R41: Detach, Subst.

193.3.1

R42: The components of the referend are early investigations (1-3) (in 1.2) and two series of studies (itself an epiphoric referential, in 1.3). Under Detach, Repl = the + Conjunction of the components.
R43: A similar mechanism occurs as the subject of might operate in which is a member of the 'r' word-class (cf. chapter 2, section 3.3 and FIS, chapter 4, section 7). The referend can be taken as the subject of other instances of the 'r' word-class, e.g., in 1.1 the lymphatic system - the subject of has a role (in), in 1.7 lymphnodes (possibly lymphocytes in 1.10 identified as the primary site). Under Detach*, Repl = Subst. of the (passim) referend (or: conj. (the lymphnodes, lymphocytes).
R44: I, Subst. antigens (which precedes the referential) classifies the referend.
R45: Under I, Repl = zeroing of such.

193.3.2

R46-47: The referend of R46 is easily identified given the prior determination of that of R47. The referend of the epiphoric referential classifier is McMaster and Kidd (2) in 3.3 and Burnet and Lush (3) in 3.6 (note that the latter component is subject of infected in 3.6: it thus plays a dual role - as study and as human subject). The citation numbers assist in identifying the referend of R46 as Early investigations (1-3) in 1.2. In R46 earlier can questionably be taken as introducing a zero-referential: the studies mentioned which are earlier than other studies. However, from 193.1.3, one can conclude two series of studies are more recent than early investigations (1-3) (note the correlative status of more recent and earlier - early investigations are earlier than two series of studies). Under Detach, Repl. of R46 = the + early investigations (1-3). Under Detach for Epiphora, Repl of R47 = Conj. of the two components given above.
R48: Detach, Repl = the (48).
As in other sentences containing epiphoric referentials (193.1.1, 1.3), the complement of had been concerned with, i.e.,the sequence of events...virus, is epiphoric though not referential - it seems-to segments of the following sentences.

193.3.3

R49: R49 could also be construed as anaphoric to active virus in 3.2, I, Subst.
R50: I, Subst.

193.3.4

R51: Detach*, Subst.
R52: Detach. Repl = the (52); neutralizing is thus related

to anti- (or: against).
R53-54: Detach*, Subst.
R55: The referential-phrase occurs in a position where after the injection (or: an instance of ":GJB") is found in many other sentences (cf. chapter 3, section 3.23). Use of the experiment is presumably connected to the fact that experiments are measured in duration from the onset of the injection of antigen - at least in respect to determination of antibody concentration and other aspects of the reaction. The referend can thus be given as: following the endermal injection of active vaccine-virus into the ears of rabbits in 3.3 with Repl (under Detach) = Subst.; of in 3.4 is deleted (cf. section 6 of chapter 5)

193.3.5

R56: Detach, Subst.
R57: Detach, Repl = Pl (57). If the reconstructed of the animals in 3.4 were included in the referend, an adjustment for number-agreement would not be needed
R58: I, Subst.

193.3.6

In 3.6, the intranasal route and the mediastinal lymphnodes can introduce of the animals with the animals anaphoric to the occurrence of mice (I*, Subst.). Influenzal virus in the second conjunct can be regarded as anaphoric to virulent influenzal virus in the first (as specificity is typically to an injected antigen), I, Subst.
R59: The referend of R59 is the first conjunct of 3.6. This is a rare instance in which a referential in a science-language sentence includes in its referend a phrase classified as M (Burnet and Lush (3)). As part of the replacement, the referend could be passivized with deletion of the subject, yielding (under I): ...4 to 6 days after mice were infected with...route in which the M-segment does not occur. Alternatively, a causative transformation (GEMP 6.8) can be applied to the first conjunct, yielding Burnet and Lush (3) caused infection of mice with...route. The referend is here infection of mice with...route (under I, Subst), in which no M-segment appears. The form of the zero-referential should also be noted: it is given as this and not after the injection given the preceeding infected. [Infected could be rewritten an injected mice...route so that virus multiples in which case (after) the injection is an appropriate zero-referential]

194.1.1

R60: I, Subst. The resultant is more acceptable if to be is reconstructed after felt.
R61: I, Repl = the (61). Employing the agent as an antigen is equivalent to "injecting the agent", through a zero-

referential (into) the animal is not reconstructed (cf. Preliminary Observations, 197.3.1).
R62: I, the (62)
The in the tissues is akin to generic the and is not considered.

194.1.2

R63: The referential does not have a definite referend: the referend can be taken as - it was felt desirable...tissues, or investigate...tissues or no possibility.....tissues. Depending upon the referend chosen, the sense of the "argument" presented in 194.1.2 differs. The first referend is 'in accord with' a study being undertaken, the second with a study being undertaken of the immunological response in the rabbit..., the third with preparations...being inactivated by exposure to UV rays. In the first two cases, Repl (under Detach) = Noming (63); in the third there is can be taken as a dummy subject and Repl = Noming (there is no possibility...tissues) = there being no possibility...
R64: I*, Subst.
R65: I, Repl = Poss (65)
R66: The referend and replacement is as in R42 (cf. 193.3.1)

194.1.3

R67: Detach, Repl = the + (67).
R68: Detach, Subst.
R69: I, Subst.
R70: I*, Subst.
R71: I*, Subst. The proximate referend is noted.
R72: The referend can be considered passim in 193.1. Alternatively, the popliteal lymphnode announces (of) the animal, cf. R71.
R73: In R73 itself can be regarded as referential to the node which precedes it. Replacement (under I) = Subst. accounting for the emphasis associated with the reflexive form -self. Replacement of the node (or: the node itself by its referend the popliteal lymphnode (I, Subst.) yields a sentence in which the nuance of emphasis is lost.
In 1.4, the other foot-pad can be regarded as introducing a zero-"set" referential - of the (two) foot-pads. Resolution of the referential would require an implicit sentence, e.g., Rabbits have two foot-pads. Alternatively, the content of the implicit sentence might be regarded as 'implicit' in the use of the other (foot-pad) here; the other N pertains to one member of a two-member set (cf. 193.1.5, R12 and section 3.1 of chapter 3)

194.1.5

R74: Detach, Repl = Nom (74) = That (74)
R75: The referend, in 194.1.2, itself contains a classifier

- response which does not occur referentially (on response, reaction as classifiers, see FIS: chapter 4 section 3). Detach, Subst. (reaction may here be taken as a synonym of, rather than as a classifier of, the immunological response
R76: The zero-referential the antigen is announced by specificity. The referential, given the referend as known, would be more accurately rendered as the antigens, each of the antigens. Detach*, (Repl = Conj (76 1/2, 76 2/2).
R77: The zero-referential is taken to be announced by reaction. Detach Repl = Conj (Noming (77 1/2), Noming (77 2/2))
In 1.5, further can be taken as an introducer: a control on the specificity of the reaction further than [the control on the specificity of the reaction above]. The zero-referential refers to the first conjunct of 194.1.3 [Preparation of influenzal virus being injected into only one foot-pad provides a control on specificty in that determinations are made of antibody content to that particular virus only]

194.2.1

The first three occurrences of the definite article in this sentence are considered instances of the determinative use of the. The initial occurrence may be anaphoric to the subtitle, though the subtitle as is is questionably a segment in the text to which a grammatical assignment of categories can be made. If the subtitle is rendered as a sentence, e.g., viruses are prepared (as follows), then a referend for the initial the is available. The second and third occurrences of the could be considered part of anaphoric referential phrases, e.g., to 194.1.4 one type of influenzal virus...and a heterologous type. If so, this would be an exceptional case of a referential phrase in the Methods and Material section cross-referring to a referend in another section of the article (see chapter 5, section 5). (One might note that choice of the 194.1.4 referend is supported by text-sentences 200.4.1.3 which distinguish the two strains of virus as heterologous to each other)

R1: respective (along with the) introduces a zero-referential; the seed-cultures themselves are not ordered, e.g., in time. The respective seed-cultures can be rewritten the seed-cultures of each of them (cf. GEMP: 317 on the relation of respective to words said to be members of an ordered set). The zero-referential given, i.e., the respective viruses, may require an implicit sentence, e.g., seed-cultures are of viruses. Rule of paraphrase is I, Repl = Subst.

R2: The asterisk cannot, strictly speaking, be considered a referential in line with the definition of referential-relation (chapter 1, section 5.3) as it is - without alteration - not a phrase in the text (cf 194.2.1 on the subtitle as possible referend), but rather a conventional reading instruction particular to written discourse. The asterisk could be rendered as (part of) a higher-order metalinguistic referential relating to the organization of the text, e.g., see below (chapter 1, section 4; chapter 3, section 1). Here the asterisk is taken as an indication to substitute the footnote provided (excluding citations, the only footnote in the article). The footnote contains a rare occurrence of a proper name not connected in some way with a citation (see also "Acknowledgement", 206.5.1)

R3: The referential phrase indicated could, given the two occurrences of the, be regarded as two referential phrases. The Rule of inference is Detach, Repl = Subst.

194.2.2

R4: A component sentence of 194.2.1 is 10-day-old chick-embryos are inoculated with 0.2 ml...seed-cultures. By a rule of inference: S_1 (A N_1) $\rightarrow$ A N_1 wh (N_1) be a N_1, one

obtains 10-day chick-embryos which are inoculated...are chick-embryos (Note: in the rule of inference, A (for adjective) = false, erroneous, etc., though see Estival et al. 1981: 31-32 for qualifications). From the sentence and the general sentence given as 'Assumption', one can conclude (by instantiation) the particular sentence given in angled brackets, thus providing a referend for R4 the eggs. The rule of inference is Detach, Repl = the + (4 1/2) + wh (4 1/2) + (4 2/2)

194.2.2

R5, R6: The possible referends of these "time-related" referentials are the prior sentence-like fragment inoculating 10 day-old...seed-cultures and 10-day. Replacement of R6 by the former does not yield a consequence of the text (a judgment confirmed by the informants). Thus R6 is referential to the latter phrase, R5 to the former. R5, i.e., then, can be rewritten as (just) after that (GEMP: 71) with that the referential phrase (alternatively, insertion of (just) after can be considered part of the adjustment). Assuming the former, the rule of inference is Detach, Repl = Noms (5) = the inoculation of 10-day old chick-embryos with 0.2...seed-cultures.

R6: incubation (alterantively: period of incubating) is included in the referential phrase introduced by further as the comparison is in respect to incubations. Detach Repl = Subst; the required plural, i.e., 10-days is obtained either as an adjustment ((P1 (6)) or by first reconstructing 10-day-old chick embryos to chick-embryos which are 10-days -old. From the secondary sentence chick-embryos are 10-days old and a refinement of the preceding general sentence to chick-embryos grow only in eggs, one can conclude chick-embryos grow in eggs for 10-days (the rule of inference: N_1-pl V* only P N_2; N_1-pl be A_t (old) $\rightarrow$ N-pl V* P N_2 for A_t, with V* a subclass of verbs such as live, dwell, inhabit and A_t a subclass of temporal adjectives such as two years, five weeks, etc.). From this sentence and said 10-days is a period of incubation, one can obtain chick-embryos growing in eggs for 10 days is a period of incubation.

R7: The referend is either 48 hours or the preceding sentence (a not uncommon situation with which). Replacement of either referend under RelDetach yields a consequence of the text. The former referend is indicated (the latter contains a number of referential phrases which makes its replacement awkward through possible).

R8, R9: The in the allantoic fluids and harvested are taken to be announcers of them; determining the referend for R8 would be assisted for R8 given an implicit sentence: allantoic fluids are of the eggs. Rule of paraphrase is I with Rel = Subst. [harvest is not a term specific to immunology but is "biology" - related]

194.2.3

The initial occurrence of the is considered determinative given the restrictive adjunct to be used as vaccines (that the adjunct is restrictive is established semantically, i.e., as it follows that some fluids are not used as vaccines, see Hiż, "A Significant Semantics", pp. 11-14). The fluids could be connected to the 2.2 occurrence of the allantoic fluids if one rewrote the fluids to be used as vaccines as those of the fluids to be used as vaccines with those determinative, and the fluids anaphoric to the occurrence of the allantoic fluids (by Detach. Subst) (cf. chapter 1, section 8.4).
R10, R11: To obtain a consequence containing referends for these referentials requires the first component sentence of 2.3 and the general assumption given. The consequence, given in brackets is by instantiation and 'modus ponens'. The rule of inference (for replacement of the referentials) is in both cases Detach. The secondary and tertiary components of the referends of R10.11 are the same. Repl = the 10 1/3 (11 1/3) + 10 2/3 + wh (10 1/3) + 10 3/3
R12: I, Subst.
[resuspended suggests a prior suspension. Queried on this, the informants note: there is no reference to the first suspension - virus grows in suspension if the egg has been inoculated with the virus. This sediment is then "resuspended".]

194.2.4

R13: Detach Repl = (13 1/2) + wh (13 1/2) + were (13 2/2) with an adjustment of was in 2.4 to P1 (was) = were (given the sediments). The referend is established by noting that the sediments are part of the virus: given N_1 is separated (divided, etc.) into N_2 and N_3, the correlative verb is: are part of, ie. N_2 and N_3 are part of N_1. [The relation of concentrated in R13 to the second referend component could be made apparent by use of an implicit sentence: When the sediment of the virus is resuspended in a smaller volume than the original fluid, that is "concentrated". One can, therefore, say that concentrated pertains to the virus in the sediment]
R14: I, Subst.

194.2.5

R15: the nominalized form preparations and all pointing to the sum of the preparations can both be regarded as announcers. The zero-referential introduced is determined from the subtitle. Detach Repl = P1 (15).
R16: Rewriting their capacity as the capacity of them allows for a "more readable" (less awkward) replacement. I, Subst. Those in those vaccines used is taken as determinative: vaccines can be anaphorically related to the reconstructed the viruses (as a classifier) by rewriting

those vaccines used as those of the vaccines which were used, with the vaccines anaphoric the viruses (I*, Subst), cf. opening note of 2.3 above.
R17: RelDetach, Subst (yielding Those vaccines were used).

194.2.6

R18: Detach, Subst. The referential phrase with these includes in its referend the adjunct which were used.

194.2.7

R19: The referend is not clear: the in R19 could be taken as determinative. As indicated, Repl (under Detach) = 19½ + wh (19 1/2) + 19 2/2.
R20: Rel Detach, Subst. as antigen is akin to a classifier.
R21: I, Subst.
[Urates are an undesirable salt contaminant of the virus as obtained in allantoic fluid. Dialysis against saline solution is a method of removing the urates].

NOTES TO INJECTION OF RABBITS

194.3.1

R22: If the initially occurring the is regarded as anaphoric, the only possible referend is the subtitle, which may be rewritten as (Rabbits) = 22½ (are injected) = 22 2/2 as follows (or: in the following way). Detach Repl = the 22 1/2 wh (22 1/2) 22 2/2. The possibility of an epiphora in the rewritten subtitle (follows) is not considered here (chapter 3, section 1).

The ambiguity in 3.1 between the rabbits collectively or individually weighing about 2000 g. would be resolved if each of them (with them referential to R22: I, Subst) were inserted before weighing. This would require an implicit sentence concerning the general range of values for the weight of rabbits.

194.3.2

Injection preceded by prior to and the determiner any is not itself a referential but can be considered an announcer of its arguments as referentials: of the antigen, into the animal. The former is referential to viruses (or: vaccines) - passim in the preceding paragraph by Detach*, Subst.; the latter is epiphoric to each rabbit (I*, Subst). Each in each rabbit can introduce a referential (of) the rabbits with its referend either R22 or, as 3.1 states an identity, the occurrence of female albinos or chinchillas (Detach with Repl (in the first case) = Subst. or (in the second) = the female albinos or chinchillas (with a zeroing of rabbit after each)
R23: Both the in the heart and collected are taken as

introducers of R23 (rather than writing in 2 referential phrases). I, Subst.
R24: specimens introduces the tissue; the tissue mentioned prior to R24 is the referend, serum. I*, Subst.

194.3.3

R25: The initial the is either determinative or anaphoric, as indicated, to the phrase in 194.2.6, Detach. Subst.
R26: I*, Subst. The referend given is the most recent mention of an antigen in the preceding paragraph; note in 2.7 the occurrence of antigen in a classifier-like role, i.e., as antigen.
R27: I, Repl = 27 1/3 + 27 2/3 + wh (27 1/3) + 27 3/3. The text-sentence from which the consequence containing the referend is derived is the preceding. From this sentence and the general assumption given, a sentence is inferred (by instantiation) with a referend for R27.

194.3.4

R28: The referend is passim; the prior text occurrence of rabbits is noted. Detach Subst. An adjustment is required: Pl (was) = were (for each of its occurrences) upon replacement of the plural referend (see chapter 1, section 7 on the absence of number-agreement).
R29: I*, Subst. The occurrences of the in the knee and the popliteal lymphnode are regarded as both introducers of R29.

194.3.5

R30: Detach*, Subst.
R31: I, Subst.

194.3.6

R32: Detach, Subst.
R33: then is rewritten just after that (cf. R5 above) with that anaphoric to the preceding sentence (or, possibly, just the second conjunct of 3.5)
R34, 35: Detach*, Subst.

195.1.1

R36: Detach. Repl = the 36 1/2 + wh (36 1/2) + 36 2/2 (the second component does not included the reconstructed from it or: it must be resolved prior to replacement
R37: I, Subst.
R38: I, Repl = 38 1/2 + wh (38 1/2) + 38 2/2
(alternatively: the first component of the referend is the reconstructed R37 which must be resolved prior to replacement.

195.1.2

R39: Detach Repl = 39 1/2 + wh (39 1/2) + 39 2/2
R40: Detach. Repl = Conj. (40 1/2, 40 2/2) = 40 1/2 and 40 2/2. Upon replacement, was is adjusted to were. cf. R13 on the correlative relation between separate into (from) and are parts of.
Under the operator until, each part is zeroed as subject of was tested, GEMP 147)

195.1.3

R41: Detach. Subst. The proximate referend, itself a referential R32, is given.

195.1.4

R42: The referend is a discontiguous phrase. Detach. Repl = 42 1/2 + 42 2/2
R43: Detach. Subst. Added can be considered an announcer of a zero-referential; given R42, the zero-referential would be most precisely rendered as the result of grinding, with grinding referential to the same referend-components as those of R42 (the preposition introducing the zero referential is to). Rule of inference is Detach with Repl = Noming (42 1/2 42 2/2) = (the result of) the lymphnode being ground (in a mortar solution), see R44 below.

195.1.5

R44: Detach*, Repl = 44 1/3 + 44 2/3 + wh (44 1/3) + 44 3/3. The referend may be determinable without implicit classifier-sentence (noted below); the replacement of the posited zero-referential introduced by added, i.e., the result of the lymphnode being ground can be altered to the ground lymphnode. Given the implicit sentence - saline is a suspenion, the ground suspension pertains to the ground lymphnode as suspended in saline.
R45: From the first clause of 1.5 The ground suspension was cleared by centrifugation, the assumption cited in 194.2.3 regarding centrifugation, and the classifier-sentence noted, one obtains (by instantiation of 194.2.3, substitution of the classificand in 1.5, and 'modus ponens') the consequence given. Supernate in R45 is synonymous with supernatant fluid. Sentence 195.1.5 S_1 and S_2 can be transformed to $S_1.S_2$. The rule of inference is then Detach, Repl = the 45 1/3 + 45 2/3 + wh (45 1/3) + 45 3/3, i.e., the supernatant fluid into which the ground suspension was separated. (See notes on 195.1.2 on the zeroing in until tested).

195.1.6

R46: Rather than decompound the referential-phrase, it is taken simply as referential to the phrase occurring in 194.3.6. Detach Repl = the 46 1/2 + wh (46 1/2) + 46 2/2 (the referend indicates that the appropriate verb in decompounding the heart-blood is collected from, i.e., the blood collected from the heart)
R47: Detach, Repl = Nom-ing (47 1/2 47 2/2), i.e., the supernate being stored at -10C.; repetitional zeroing of being stored at -10C. results in (in 1.6) ...and similarly to the supernate stored at - 10C.

LYMPHOCYTE-EXTRACTS

195.2.1

R48: lymphocytes is given as the phrase indicating a referential, though reconstruction of a zeroed the may be more appropriate. If anaphoric, mention of lymphocytes, centrifugation points to 195.1.1 as the sentence containing the referend. Detach. Replacement is difficult: it is not clear whether by established transformations (adjustments), one can reach the desired the cells which were separated from plasma by centrifugation of the lymph.
In the text-sentence, zeroing of which is leaves the equation given in apposition to an expression, which could be taken as an epiphoric referential classifier (I*, Subst). Lymph in lymph collected could be considered referential to efferent lymph.
R49: RelDetach, Subst.
R50: where can be rendered in which with which referential. RelDetach, Subst (or: in can be inserted as an adjustment).
R51: The referential is metalinguistic. I, Subst.
R52: I*, Subst.
R53: I, Subst. The decomposed the cells of the lymph could be taken itself as referential to R48.
R54: I, Subst (cf. R51).

195.2.2

R55: Detach*, Subst. The result of replacing R49 indicates the appropriate referend.
R56: I, Subst. The proximate referend, R55, is noted (further replacements are thus possible).
Volumes does not appear to serve as an announcer: of cells may be reconstructed as an inverse of an appropriate zeroing.
an earlier study (7) could be regarded as epiphoric to the bibliographic citation; the comparative is not considered to introduce a zero-referential, e.g., this study chapter 3, section 4).

195.2.3

In the decompounded form, counts is reconstructed as appropriate under total (cf. 2.1 total cell-count).
R57,58: Detach. Subst. The result of replacement is identical with the text-sentence though the referends, themselves referential phrases, allow for further replacements.
R59: RelDetach. Subst. Replacement should be made after resolution of R60.
R60: The referential phrase is a pro-adjunct. Detach. Subst.

195.2.4

R61: The referential is to the subtitle cf. R22 above and notes to 194.2.1 As an announcer, the extract is typically an introducer of: to the tissue [extracts are generally of tissue. In this case we are dealing with lymphocyte sediment from the lymph as a tissue]. The subtitle lymphocyte-extracts might thus be rendered as lymphocyte (sediments) of tissue-extract. Detach. Subst.
R62: T, Subst. (a can be rewritten the without semantic effect)
R63, 64: Detach. Subst. cf. R58,59.
R65: From sentence 195.1.1, assumption 194.2.3, and Lymph is a fluid, it is concluded (by substitution in 195.1.1 instantiation of 194.2.3, and modus ponens' from 195.1.1 and the instantiation) that The lymph is separated into a supernatant fluid and sediments. From the assumptions that ~~plasma is a fluid and that~~ Lymph contains plasma and cells, one can conclude (given the consequence above): The cells separated from the lymph by centrifugation are cell-sediment. The other half of this identity is substituable for R65 by Detach.
R66: I, Repl = Pl (66). If R65 is reconstructed to the sediment of the cells, R66 is referential to the cells, i.e., with no adjustment required.
R67: The sentence in angled brackers is the assumed classifier sentence; medium is a common classifier for various terms which pertain to fluids (cf. 194.2.3 which contains the sediments are resuspended in...saline solution: given medium as a classifier, one could obtain saline solution is a medium for suspension - (a suspending medium). In the present case - saline solution is a medium in which the cells are suspended (dispersed)). The 'classificand' is substituted, I*.

195.2.5

R68: This suspension, a classifier, pertains to the suspending medium and its contents (the cells). Detach. Repl = 68 1/2 + wh (68 1/2) + 68 2/2.
R69: The nearest referend, R68, is indicated, I, Subst.
R70: Then is written as after this (cf. R5, R33 above),

I, Repl = Nom-ing (70), i.e., being subjected to...three times Respectively is not clearly a referential, but metalinquisitically coordinates (in respect to order of occurrence in the text), freezing to its modifier at -70C, and thawing to at 30C. Centrifugation can be said to introduce a zero-referential of it with it referential to R69 (I, Subst).

195.2.6

R71: The consequence is obtained in a manner paralleling the situation with R45 above. Detach. Repl = The 71 1/3 + wh (71 2/3) + wh (71 1/3) + 71 3/3
R72: Detach. Subst. The zero-referential introduced by resulting and its replacement might serve to eliminate, i.e., render dispensable, some of the implicit sentences concerning centrifugation above.
R73: The referend is passim, e.g. R66. Detach. Subst.

TECHNIC OF ANTIBODY-DETERMINATION

196.1.1

R74: The referential relation here illustrates a not uncommon case of epiphora in which the referend is an enumeration (signalled in this case by the numerical modifier two). The second referend component contains a referential to the first component; it may optionally be resolved prior to replacement of R74 (cf. R80). The rule of inference for epiphora detaches the sentence containing the referential phrase; it can be schematically presented as: S_i, S_{i+1},..., S_{i+n} $(n > 1) \rightarrow S_i$. Repl = Conj (74 1/2, Nom_s (74 2/2) = The original method described by Hirst and Pickels(12) and the modification of this method by Salk(13) and others (see chapter 5, section 4 for further discussion of patterns of epiphoric cross-reference)
specimens can be considered to announce a zero-referential: (of) the tissues. The referend is either passim or the tissues noted in 196.1.8, i.e., lymphnode, blood-serum, and lymph in the later case, the rule of inference is as above for R74, Subst. (else, Detach, Subst)
R75: The referend is passim; to mentions of the virus in the subsection Preparation of Viruses. Detach, Subst. (cf. chapter 3, section 3.23 on the zero-referential here)

196.1.2

R76: The referend is R74 (establishable by both). As R74 is epiphoric, R76 could be taken to "inherit" the referends of R74. Repl = The (76): the remainder of 196.1.1, i.e. minus referend 76 can be attached as a wh- adjunct: wh (76) (196.1.1 - (76))
R77: I, Subst.
Influenzal virus in antibodies to influenzal virus could be

considered referential to the preceding occurrences in this sentence. In 1.3 the initial occurrence of the along with the modifier original (not locally synonymous with novel or the like) may be taken to introduce (of) the methods with the methods anaphoric to R74 (though, cf. 196.1.7 R96 which suggests - if the reccurence of original is indeed related - that original here is not an announcer). The definite article along with method is considered to introduce R78.
R78: do this is taken as a single referential phrase, although do may be regarded as pro-V(erb) and this as referential to the object of the verb (cf. chapter 1, section 9). Detach. Subst.
R79: I, Subst.

196.1.4

R80: The referend is the previously mentioned method (in 1.3) Detach. Subst. (cf. R96 on another possible referend) The in the pattern formed... is considered determinative, though it can be construed as anaphoric given an implicit sentence, e.g., settling of agglutinated erythrocytes forms a pattern (Note that settling here is a (near) synonym of sedimentation in 1.3). So might rewritten as: in a way that, to the point that and considered a case of determinative the.
R81: As noted in chapter 3, section 3.23, agglutinate can be established as an operator with arguments of the word-class C (the cells) and G (in this section, the virus serves as a classifier), cf. 196.1.2 where the arguments are given agglutinated announces the absent argument the virus. Detach. Subst.
R82: The similarity is in respect to determinations, hence the choice of the zero-referentials. The prior referential, R80, indicates, the location of the refrend in 196.1.3; the referend can be further specified by noting the local synonymy of determine and measure in 1.3. Detach. Repl = Nom-ing (82) = measuring the degree of sedimentation... bodies.

196.1.5

R83: The referend is used to modification in R83: modified along with its arguments in 1.4 comprise the referend (the second argument of modify in 1.4 is R80 which requires resolution prior to replacement of R83). Detach. Repl = Nom_S (83). The comparative form -er in greater announces a zero-refential (this would require a decomposition of 1.5 into component sentences). As the comparison is between methods (the referend-components of R74), the zero-referential is the other method: Because of the greater sensitivity of the Salk modification to the other method,... with the other method (given R83's cross-reference to the second component of R74) anaphoric to the phrase indicated as the first referend component of R74 (74 1/2). Detach. Subst.

R84: technic classifies the referend The Salk modification (R83) I*, Subst.

196.1.6

R84.5: Replacement of it in it was found that S is problematic: That S was found (with the complement replacing it) is of questionable acceptability. The difficulty appears to reside in the fact that find (presumably an Onn operator) is here extended 'metaphorically' to have an operator (i.e., a sentence) as its complement (see GEMP: 67-68 for the parallel case of see) and in this usage is not transformable in ways possible for find as an Onn, e.g., the sentence cannot be passivized. One option is to state an adjustment substituting for found a local synonym, e.g., discovered, which has an operator (a sentence) as its complement and then to replace it. Another is to consider it not as a referential but as part of an assertion-indicator It was found that. The first option is taken here (as in the comparable cases below - R99.5, 113, 127, 161, 163.5): I, Subst.
R85: However, following GEMP 9.62, is analyzed as composed of a conjunctional in spite of plus a pro-sentential referential (this). Detach. Subst.
R86: Detach. Repl = 86 1/2 86 2/2.
R87: Given the referend of R86, the referend is determined to be R83. (Note that R83 in turn cross-refers to a phrase in 1.4, in which pattern occurs in a description of the method.
R88: The referend is determined given (1) the comparative-like hold no advantage over with resolution of R87 (see Notes to R83) and (2) Hirst; technic is a classifier of method (cf. R84). Detach*, Subst.
R89: Detach. Repl = Nom_S (89).
R90: see R81.
R91: Also is rewritten as similarly to this (GEMP: 398); as the similarity is in respect to "being greater (in one test than in another)", the prior occurrence of greater assists in locating the referend. I, Subst. Upon substitution of the referend, the pattern-method can, given R92 - referential to the pattern-method (see below) - be pronounced by its: its greater sensitivity.
R92: test classifies method (cf. R84, 88 on determination of the referend). I*, Subst.
R93: The comparison is of tests; hence the zero-referential (note the parallel cases involving comparisons above) I*, Subst. [normal tissue factors: substances present in tissues which are unrelated to any effect of the injection of influenzal virus]

196.1.7

R94: Detach. Nom-ing (94)
R95: This has its referend in 1.3, see note on R82 concerning determinations. Detach. Subst.
R96: The may here be regarded as determinative or anaphoric. If anaphoric, R96 does not cross-refer to the phrase indicated as the first referend-component of R74 in 196.1.3 but appears to refer to the description of the method. This is supported by the fact that 196.1.3 with the reconstructed zero-referential to do this is transformable as an "instrumental" (GEMP 8.52) to The use of a photo-electric cell to...bodies is the original method to do this (cf. be the means of in GEMP 8.52 in which use of a photo-electrical cell...is classified by method. Thus, replacement is the familiar case involving substitution of a 'classificand' for a referential-classifier (method in R96). Detach*. Subst.
R97: RelDetach, Subst. where, alternately, is rewritten in which with which anaphoric to the preceding nominal phrase.
R98: Insufficient announces the referential phrase: (to) do this cf. R78. The referend is replaced (under I) with 2 adjustments (1) depassive (determinations were made) = made determinations (2) tense-agreement with the referential (made) = make.
Material pertains to whatever is tested; though a classifier, it is not clearly a referential.

196.1.8

Sentence 1.8 together with 1.9. All dilutions were begun at 1:16 has as a consequence (assuming arithmetic): There are dilutions at 1:32 etc; though steps of two is not an epiphoric referential.

196.1.9

R99: Detach. Subst.
R100: Detach, Subst. the could be considered determinative.
R101: I, Subst.

196.1.10

R102: Detach. Repl = the (102); respectively does not pertain to the order of occurrence in which dilutions were added, nor is it metalinguistic, but points to the addition of antigen to each dilution of each material.
R103: mix is locally synonymous with add(ed) in the first conjunct, the nominalization mixture cross-refers to add along with its arguments. I, Nom_S (103): the nominalization of add is rendered not as addition but the product of adding (cf. GEMP 5.22): the product of adding one half ml of... antigen to 0.5 ml...respectively.

196.1.11

R104: The referend is either as indicated or 10 minutes. Substitution of either under Detach yields a consequence of the text.
R105: Detach. Subst.

196.1.12

R106: cf. R81.
In the text, photoelectrical has been mistyped as photo-elecrical.

196.1.13

R107: Rather than establishing a referend for the endpoint by means of implicit sentences, the endpoint is taken to introduce a zero-referential, with measure an appropriate verb (as an endpoint is of some measure). In 1.12 the degree...cells is in the selection of measure. Detach. Subst.
R108: Detach. Subst. (The referend is indicated in 1.2; other, intermediate phrases, referentially linked to that in 1.2, could also be cited as referends)
R109: such an extent that S = an extent to the degree that S (with the occurring determinatively) or an extent such that S with such epiphoric to the following clause. The latter is chosen with Subst. under I.
R110: Detach Repl = (the) 110 1/2 110 2/2 (the second component does not include material which is reconstructed). The referend is not the immediately prior occurrence of red blood cells as they are said to be agglutinated, whereas R110 were left in suspension.

196.1.14

R111: I, Subst. (cf. R84.5 and R113)
R112: The referend for the classifier test in the test can be established as R96 (cf. R93 for test as a classifier of method). However, the discussion of R96 above enables us to determine a less distant referend in 1.12. Detach*. Nom_S (112) = the determination of the degree of sedimentation... cell.
R113: cf. 84.5.
R114: Detach. Subst. The referend is taken to include the zero-referential R106 along with the proposition which precedes it.
R115: The proximate referend, itself a referential, R112, is noted. I, Subst.
The comparative form in such constructions as more...as... does not introduces a zero-referential (cf. chapter 3 section 3.1)

196.1.15

R116: Detach. Subst. The proximate referend, R115, is given. Note the absence of number agreement between referential and referend. R116 pertains to applications of the test.
R117: cf. R81.
reaction is a classifier in the immunology sublanguage (FIS chapter 4, section 3), it may here be taken as referential to agglutination (passim). Its occurrence with non-specific (non-specific in its other occurrences is a modifier on agglutination, cf. 196.1.6) supports this analysis. If reactions is referential, agglutinations = Pl(agglutination) can replace it under I*.
Greater does not introduce a referential; the absence of than 1:16 is taken as the effect of end-zeroing (GEMP 3.42 - 3.43) virus in its initial occurrence can be regarded as referential to influenzal virus (passim). (I, Subst.)

196.1.16

R118: That is chosen as the pro-sentential zero-referential given the occurrence of this in the text. Detach. Repl = Nom-ing (119) = non-specific reactions not being given...or greater.
R119: Detach. Subst.
R120: The in R120 may be determinative; if anaphoric, the adjunct for antibodies is derived from an unrestrictive relative. Detach. Subst.

196.1.17

R121: Detach. Subst.
specimens is an ontroducer of: (of) the tissues with the referend as in the comparable case noted in 196.1.1, Detach. Subst.; repeated (≈ "used again") is not considered to be referential.
R122: So is regarded as epiphoric to the following clasuse, I, Subst. Alternatively, it is a variant of in order that.
R123: the with the "ordinal"-like next introduces the referential. Detach. Subst.

196.2.1

R124: The referend can be taken as the subtitle of the preceding section, Repl = Subst. under Detach (given a decomposition of the subtitle to extracts of lymphocytes.
R125: I*, Subst.
R126: sedimentation cues the referend as located in 196.1.3. R126 is here taken as cross-referring to the description of the method (cf. R96); employing precedes R126 indicating that the referend in 1.3 starts with a photoelectrical cell, preceded by the synonymous use. Test as noted before is a classifier. Detach*. Subst.

196.2.2

R127: cf. R84.5.
R128: Detach. Nom-ing (128). cf. R85.
R129: Detach. Subst.
R130: The first prior mention of the pattern-test (R92 in 196.1.6) is given as the referend. Detach. Subst.
R131: I, Subst.
R132: I, Subst.
R133: The prior nominal phrase, that, is a referential (R132). Either R132 is resolved prior to replacement of R133 or the referend of R132 is also taken to be that of R133. With the latter, RelDetach with Repl = this (133), rewriting the as this.
R134: The referend is influenzal virus (passim), see 196.1.14. Detach*, Subst. So in so high can be rewritten high to the degree (that) with the in its determinative use. Titers can introduce a zero-referential (of) it, the referend of it being the prior occurrence of antibody in the compound antibody-titers.

196.2.3

R135: Detach. Subst.
the in the lymph-plasma....them is considered determinative (see Note to R139 below).
R136: I, Subst.
R137: Detach. Subst. (See 196.2.2).
R138: Rel Detach. Subst. Permutation of of + the replacement of R138 yields a more 'conventional' word-order.
R139: R124 indicate the preceding subsection as harboring the referend. The referend is itself a referential phrase, R65 in 195.2.4. This referential in turn has as its referend a phrase obtained by use of implicit sentences and sentence 195.1.1. (in the subsection injection of Rabbits). If the in the lymph-plasma is regarded as anaphoric, and lymph-specimens decompounded to specimens of the lymph, plasma and the lymph in 195.1.1 are referends of these anaphoric referentials. For R139, Detach., Subst.

197.1.1

The initial occurrence of the is regarded as determinative
R140: Detach, Subst. antigen classifies influenzal virus (passim), cf. R134.

197.1.2

R141: Detach. Nom_S (140) = the product of adding 0.4 ml... to lymph (cf. R103).
R142: cf. R141. Recall that replacement of referentials is made one-by-one; the zero-referential R141 is not considered part of 197.1.2 when replacing R142.
R143: The referential phrase occurs as subject of was incu-

bated: comparison with other subjects in the selection of incubate (196.1.10, 197.1.2) indicates that the test here (as opposed to its occurrence as R131) relates to the material which is tested (as opposed to the method by which it is tested). R142 is assumed to be resolved prior to replacement of R143. I*, Nom_s (143) = the product of adding 0.2 ml of a 1 per cent suspension of cells to the product of adding 0.4 ml.....to...several dilutions of lymph.
R144: The referential phrase specifies the cells as red I, Repl = the (144).
R145: Detach. Repl = Pl (145). The referend is in 196.1.4. Had in had settled might be considered a tense-referential (GEMP 6.12) - these cases are not considered in this work.

197.1.3

R146: Detach. Subst.
The titer can be considered as introducing: (of) it (or: the antibody) with the referend in 1.3 being antibody in antibody-preparation (= preparation of antibody); I. Subst.

197.1.4

R147: Detach. Subst. Note the usage of test here in contrast with R143 above.
specimens announces (of) the tissue: given R147 as resolved, the referend is the occurrence of lymph in 197.1.1.
R148: RelDetach. Subst.
R149: Detach. Subst. photoelectrical densitometer cross-refers to photoelectrical cell in 196.1.12.

197.1.5

The two occurrences of titers in 1.5 may each be considered to introduce: (of) it (or, more comfortably, of the antibody) with their referend the occurrence of antibody in 1.4.
Detach. Subst.
R150: The referend noted is the prior occurrence of the pattern-test. Detach. Subst.
R151: 196.2.2 contains the first prior occurrence of the related sedimentation-test (R126) which is noted as the referend. Detach. Subst.
R152: us is a rare occurrence of a personal pronoun, considered referential to the authors' names in the title of the article. Detach. Subst.
R153; R154: The referends are assigned to R153, 154 in respect to their order of occurrence (R150 and then R151), though the reverse assignment is possible. System here is a classifier of test. I*, Subst. (The referends may also be taken as inclusive of titers obtained in preceding the referends indicated here)

197.2.1

R155: The referend is noted as the subtitle of the prior section. Detach. Subst.
R156, 157: The referends of the reagents, the respective reagents can be discerned without recourse to implicit sentences by noting (1) thus (R158) in 2.2 which indicates a connection between 2.1 and the remainder of 2.21, (2) cell-extract and influenzal virus are nominal phrases classified by reagents. Partial confirmation of this is obtained by noting that one of the reagents, influenzal virus, is stated in 197.1.1 to be of 0.4 ml volume. A ten-fold reduction (2.1) of this is 0.04 ml as stated in 2.2 (thus is tied to this arithmetical consequence, see R158). R156 is replaced by substitution under the Detach* rule for epiphora noted in 196.1.1.
R157: respective announces the zero-referential; respective pertains to members of an ordered set - the respective concentrations or proportions can be rewritten as the concentrations or proportions of each of them (cf. R1). The referend is R156 (which allows for replacement in R157 of the referends of R156). I, Subst.

197.2.2

R158: Thus, following GEMP: 395, is rewritten in accord with this (cf. chapter 3, section 3.1). Detach. Nom-ing (158) = volumes of the reagents being reduced....semantically, thus signals an inference, i.e., the arithmetical calculation noted above.
R159: The referend is passim. Detach. Subst.
Twofold may 'allude' to steps of two in 196.1.8; the dilutions mentioned are of different materials.

197.2.3

R160: all and these both function referentially: all in connection with the conjunction or closure of quantities.
Detach*, Repl = 160 1/2 + wh (160 1/2) + 160 2/2

197.2.4

R161: cf. R.84.5.
R162: Detach*, Subst (see Notes on R143)
R163: micro- on method pertains to employment of reduced volumes of the reagents. Detach*, Repl = Nom-ing (163)
R164: cf. R84.5.
R165: By its contrast with the micro-tests and micro-method (R163 and R166). The referend pertains to volumes of reagents not so reduced (197.1.1). Specimens announces (of) the tissue, with the referend in 197.1.1. (Detach*, Subst), i.e., lymph. Titer announces of the antibody with the referend passim (Detach, Subst.) Sentence 197.1.1 contains the mention of unreduced volumes (see R156, 157 on ten-fold

reduction and its connection with the volumes noted in 197.1.1). Test is a classifier (cf. R163). Detach*, Subst. R165: See R163 on micro-. Detach*, Nom-ing (165).

EXPERIMENTAL-PRELIMINARY OBSERVATIONS

197.3.1

In 3.1, was used is synonymous with was injected (cf. 194.1.1 employing the agent as an antigen, 194.3.3 the fluids to be used as vaccines (also 194.3.5, 3.7; 198.1.5; 198.2.1, 204.1.7). In these occurrences was used does not occur with a complement such as into the hind foot-pad, into rabbits. Accordingly, use is not regarded as an introducer of a zero-referential, e.g., into the animals.

197.3.2

R1: The referend presumably does not include a concentrate of in 3.1 as concentrated 200-fold...formatin is an unrestrictive modifier of the PR8 and Weiss strains...virus. Preparation is a nominalized form of the adjectival modifier prepared in the referend, and questionably a classifier of the referend. Detach. Repl = the (1).
The in the PR8 and Weiss strains...virus is considered determinative; there is no prior mention of Weiss strains, although PR8 strains (of the type A) and Lee strains (of type B) occur previously in 194.3.1 [the named strains of a virus are regarded as antigenically-identical]
Centrifugation can be taken to announce (of) it with the referend allantoic fluid...virus in 3.2. (I, Subst.)
R2: I, Repl = (the) (2).

197.3.3

R3: The referend is passim. Detach. Subst. Prior occurrences of popliteal lymphnodes which are available referends (cf. 194.1.3 and 194.3.4) relate to rabbits into which a different antigen, inactivated by ultraviolet rays, has been injected. Thus, it is not a matter of the same lymphnodes. The same remark applies to the zero-referential occurrences of the animal below.
R4: The referend is passim (rabbits), cf. R3. Detach. Subst.
R5: Detach. Subst.
R6: cf. R4.
R7: Detach. Repl = Nom_S (7) = the use of a concentrate of ...B.
R8: The referential introduced by examination might also be construed as anaphoric: its referend is a referential phrase anaphoric to R3 (which precedes R8 in order of occurrence). I, Subst.
R9: I, Subst.

R10: In the referential phrase, same need not be taken as an introducer, e.g., same as that (picture); gross can be related to gross examination in 3.3 if R10 is expanded into the same picture shown by the gross examination are not clear. There are options in determining the referend and in replacement. The referend may be taken as inclusive of the nodes in 3.3 (note that a picture serves as a classifier of the complement of showed). In this case, under Detach*, the referend is adjusted by Nom-ing in replacement, i.e., the nodes being very large,...swollen. Given the later occurrence in 3.4 of the popliteal lymphnodes...,the nodes can be pronominalized as their, yielding: Their being very large...swollen characterized the popliteal lymphnodes... Alternatively, 3.4 can be passivized with the replacement either as above or, with the referend indicated in the text, a change of by in the passived sentence to as with Nom-ing (10). The latter replacement (under Detach*) yields: The popliteal lymphnodes excised on the 5th day...were characterized as being very large, hemorrhagic, and intensely swollen (were characterized as may be zeroable as an operator with broad selection, GEMP 3.54)
R11: cf. R6
R12: cf. R5
R13: cf. R7

197.3.5

R14: I, Subst.; group is considered an announcer of R14 (cf. GEMP 3.35)
R15: cf. R7
R16: The referend is passim. Detach, Subst (see the Note to R3). The with the body-part foot-pad, if taken to introduce a zero-referential, e.g., (of) the animals (with its referend the preceding occurrence of rabbits), yields a barely acceptable sentence. On the used with body-parts (Sam hit Ralph in the face), see chapter 1, section 6.

197.3.6

R17: To obtain a referend requries the assumption given in brackets (cf. 194.1.3 at various intervals thereafter (= after the injection) the following materials (= popliteal lymphnodes and other tissues) collected and 194.3.4). Detach Repl = 17 1/2 + wh (17 1/2) + 17 2/2.
R18: there might also be given as in that place with that place replaced (under I) by substitution of the referend. Alternatively, in is inserted as part of the replacement, i.e., as an adjustment of the referend.
R19: I, Subst.

197.3.7

[Karyorrhexis is the bursting of the nucleus of cells: incidentally, "decomposition" of karyorrhexis into bursting of the nucleus of cells would yield a sentence-type of the sublanguage grammar (rare in this article), SCW.]

197.3.8
R20: Detach, Subst.

197.3.9

R21: toxin is a pro tem classifier of the referend indicated in 3.1 (prior occurrences of the vaccine, also referential to the indicated phrase, could be taken as the referend of R21 as well). Determination of the referend is assisted by noting that the toxic effect can be rendered that which is effected by the toxin in which is effected by is an inverse member of the colon word-class (cf. chapter 2, section 3.2) and the toxin occupies the position of the G word class. Resolution of R23 corroborates this choice inasmuch as its referend, R17, is referential to an implicit sentence in which injection occurs, referring to 3.1 (In the implicit sentence given, injection is not noted as a referential). Detach, Repl = the + (21).
R22: On local as an introducer of the site of injection, see chapter 3, section 3.23. Detach. Subst. The referend may, loosely perhaps, be taken as the occurrence of the foot-pad in 197.3.5.
R23: Whereas lymphatic tissue is a classifier, the local lymphatic tissue (rendered as R23) is referential to the phrase given as R17. The referend of R17 in turn is given in an implicit sentence, the first component of which referend is popliteal lymphnodes. The phrase the local lymphatic tissue is a classifier of popiteal lymphnodes (given the site of injection indicated, see chapter 3, section 3.23) Detach. Subst.
R24: Effect is here a classifier of the preceding sentences connected to the referend of R23 (see note to R21 and FIS chapter 4.2 on the related classifier response). The first component of the referend is inclusive of severe destruction of lymphocytes, cf. R18. Replacement under Detach* conjoins (under and) the three components of the referend: the first component upon replacement is (optionally) preceded by the; the second component undergoes a weak nominalization. In the third component, could is not subject to nominalization: if could is transformed as a suffix (operator) on discern, the resultant can be nominalized, yielding. Outlines of the follicular architecture (of the nodes) being barely discernible. The replacement (with adjustments) can be symbolized as: Conj. (the 24 1/3, Nom-ing (24 2/3), Nom-ing (24 3/3)).
R25: The N with reduced restrictive relative might be considered determinative. If anaphoric, the referend is determinable in much the same way as with R21: note that in 3.9

the (toxic) effect... occupies the position of what were referred to in chapter 2, 3.2 as "response sentences", was due to is analyzable as an inverse member of the color word-class, R25 occupies the position of G. Viral agent is a classifier. Detach* Repl = the (25).
R26: R26 this property is a classifier of its referend. Replacement under Detach* requires that the referend the lymphocytopenic effect be denominalized as effecting lymphocytopenia and that the "weak" (semantically) verb have be zeroed (alternatively, having this property might be considered the referential phrase)
The result of the replacement is ... was due to the particular viral agent employed effecting lymphocytopenia [lymphocytopenia is a condition of reduced numbers of lymphocytes]
The role of the referential phrases R21-26 in carrying the "argument" given in 3.9 is mentioned in chapter 5, section 3. In 3.9, the occurrence of it is not an epiphoric referential to the complement of felt.

197.3.10

R27: Detach, Subst.
R28: R28 has as its referend the same components as R24 has and is replaced under Detach in the same manner. One can thus establish a relation between the lymphnodes in R28, i.e., R27 and the local lymphatic tissue in R24, i.e., R23 (this relation incidentally corroborates the choice of referend for R23) and between the toxic effect and the extensive damage. (damage is a (near) synonym of destruction in the first component of the referend, and - if karyorrhexis is decomposed as indicated in the note to 3.7 - of bursting in the second component).
R29: I*, Subst.
R30: I, Repl = in + (30), cf. R18 on these.
Despite in 3.10 signals (as do many occurrences of however) a counterfactual: loosely, that the authors expected that the extensive damage (including destruction of lymphocytes) to the lymphnodes would impair production of antibody.

197.3.11

R31: The referend is either as indicated which requires resolution of R30 prior to replacement = Nom_S (30) = the presence of antibody to influenzal virus in the lympnhodes (under Detach) or the extracts showed antibody to influenzal virus which (under Detach) is adjusted by Nom-ing.
Determination of the referend is made by noting the 'similar' sentence-types in 3.11 and 3.10 (AV_i). 'Repetitional'-zeroing (based on the identity - in respect to the sublanguage - of the segments represented by AV_i) of the presence of antibody to influenzal virus in yields: Similarly to the lymphnodes....
R32: The referend is passim. Detach. Subst.

R33: Detach. Nom_S (33) cf. R7.

R34: Reaction (under the negative operator no) can be taken as a referential classifier to the preceding phrase contained antibody to influenzal virus. Replacement under I* requires that the "weak" verb showed be deleted (cf. have discussed in R26) and that the tense on contained be affixed to the auxiliary do, i.e., did with adjustment of no and not (placed after did). The resultant is ...serum collected prior to injection did not contain antibody to influenzal virus. The choice of referend is supported by the contrastive conjunction whereas. The use of reaction here is aberrant as there is no reaction to, e.g.,an injection. Alternatively, the referend is simply antibody to influenzal virus in 3.11 (I*, Subst), although then the referend is not classified by reaction.

THE OPTIMAL CONCENTRATIONS OF ANTIGENS

198.1.1

In 198.1.1 there are two scopes possible for the operator further (-er): one is the narrow scope indicated; in the other, the scope of the operator is the entire sentence, i.e., Experiments were undertaken with...further than other experiments... The scope ambiguity is not resolved by consideration of possible referends. In the first case, the referend of R1 is the occurrence in 197.3.1 of the first series of experiments undertaken (containing the first prior occurrence of experiments in the text); under Detach, replacement is by Subst. In the second, under Detach, replacement yields Experiments were undertaken...further than the first series of experiments in which a concentrate of a commercially prepared vaccine of influenzial virus of type A was used (the relevant components of the referend, also in 197.3.1, as well as the adjustments required, can be readily discerned). Corresponding to those alternative readings, there are two possible referends for R3 (see below). Further experiments, as subject of the semantically weak were undertaken, may also be considered an epiphoric referential; relatedly, preparations of the PR8 strain... can be regarded as referential to occurrences of various names of preparations in the succeeding sentences (1.3, 1.4, 1.5,..., 1.8). Further experiments is, loosely, referential to the same sentences 1.3 - 1.8 (a judgment corroborated by the referend determined for R27, The experiments, in 1.9). The two epiphoric referentials would thus have to be replaced simultaneously, a situation outside the stated scope of this essay (chapter 1, section 5.5). The sentence 198.1.1 might be considered referential in its entirety to the sentences indicated. Replacement would involve a zeroing of the "weak" were undertaken, an adjustment often made in such cases (chapter 5, section 4).

R1: The referend is as noted in the discussion above. Detach, Subst.
R2: The referend is the discontiguous phrase the PR8... strain of type A in 197.3.2, Detach. Subst.
R3: Corresponding to the first scope reading for further noted above, the referend is as indicated in the text. If the later is asssumed, the referend is experiments were undertaken. Purpose is a classifier: undertaking (further) experiments is a purpose. Replacement, under I*, depassivizes the referend (with an indefinite subject) and then weakly nominalizes the result (zeroing the indefinite subject), yielding undertaking further experiments.
R4: From the general assumption given and that portion of 198.1.1 preceding the brackets, one infers by instantiation, the sentence given in brackets. Detach. Repl = the 4 1/3 + 4 2/3 + wh (4 1/3) + 4 2/3.

198.1.2

R5: The zero-referential announced by preparations classifies its referend. Detach, Subst.
R6: I, Repl = (the) (6)

198.1.3

R7: The referend is determinable by noting that rabbits is a member of the B-word class occurring as subject of had been injected with (an inverse member of J) in the sublanguage grammar. RelDetach. Subst.

198.1.4

R8: Detach. Nom-ing (8): alternatively, the referend could be nominalized as: the fact that (8).
R9: The referend can - with some looseness - be taken as feet in 1.2 (cf. R22-23 in the preceding subsection). Replacement, under Detach*, is the (9).
R10: The lymphatic system can be taken as a "classifier" of lymphnodes and some other members of the T word-class (e.g., efferent lymph), the local lymphatic system is here (i.e., given the site of injection) referential to lymphnodes (in this article, only popliteal lymphnodes are considered: see chapter 3, section 3.23). Under Detach, replacement is by substitution of the referend. Note that the absence of number-agreement here (as in R9) does not call for adjustment (chapter 1, section 6.3): the local lymphatic system pertains to the whole of which the lymphnodes are a part.

198.1.5

In respect to this sentence, the following may be noted.
(1) used as antigen is equivalent to "was injected", though no zero-referential has been reconstructed (see, e.g., note to 197.3.1). If one is reconstructed, the referend is the occurrence of rabbits (or: rabbits' feet) in 1.2.
(2) response, as indicated by the contrastive conjunction whereas is a classifier of appearance in 1.2 though it is not clearly referential to it. Replacement of response by the phrase classified would require extensive transformation of 1.5, i.e., the Undiluted allantoic fluid...produced the appearance of an almost maximal amount of antibody.
(3) Given the remark above, response could be taken as an introducer of, e.g., there or (in) the tissue. However, the choice of zero-referential and the referend thus determined, e.g., the local lymphatic system in 1.4, would be incorrect. Choice of the proper zero-referential suggests an emendation of the proposed definition of referential relation in chapter 1, section 5.3 to allow for referentials obtained by means of implicit sentences. My informants indicate that the appropriate referential is the serum (as indicated): to

obtain a determination of the optimal concentration of antigen needed to produce an immunological effect, i.e., the appearance of antibody, a comparison is made between concentrations of antibody in the experimental system, here - lymphnodes and those (maximum) concentrations in a standard (known) system which is the serum. On the basis of the remark, the zero-referentials R11, R14, R31 are given as the serum (1.7 and 1.8 explicitly compare antibody concentrations in the lymphnodes and serum).
R11: The referend is passim. Detach., Subst. (see remark (3) above).
R12: I, Repl = the (12).
R13: The referend does not include the modifier undiluted (note: the contrastive whereas and dilution of preceding R13). I, Subst.
R14: cf. R11.
Higher (-er) in higher concentrations of virus does not clearly indicate a zero-referential as the comparison is with undiluted allantoic fluid.

198.1.6

R15: Detach, Subst. (See Note to R10 on absence of number-agreement between referential and referend).
R16: I, Subst.
R17: Detach, Subst., the pad is pluralized to "agree with" the substituted referend, feet.
Injection of...foot-pad can itself be taken as referential to preparations...were injected into rabbit's feet, though an adjustment is required in addition to Nom_S inasmuch as one preparation is referred to (preparations is adjusted to a preparation with a concomitant change of were to was)
R18: reaction (under the contrastive conjunction whereas) is a referential classifier of the referend indicated (compare the situation with response in 1.5 (remark 2) where the indecision as to its referential status may be related to its occurrence before the purported referend). The complement with influenzal virus is considered part of R18 (reactions are to (with) an antigen. Replacement under I* is complicated: one possibility is to take antibodies... appeared as the referend (in 1.6) with the adjustment = Nom_S (i.e., appearance of antibodies to influenzal virus). Alternatively, a correlative form of appeared in replaces appeared in (no passive form is available) - for instance contained (antibodies appear in a tissue can be considered an alternate form of a tissue contains antibody given the results in FIS, see chapter 2, section 3.3). Showed is zeroed as a "weak" verb with placement of its tense (-ed) on the carrier do (and) and the negative no changed to not (after the carrier). These adjustments yield: did not contain antibody to influenzal virus. (cf. R34 of the previous subsection). [normal lymphnodes (as indicated in part by the constrastive whereas) are lymphnodes from uninjected animals or lymphnodes of uninjected sides of a rabbit]

198.1.7

R19: The referend is passim. Detach. Subst.
R20: Detach, Subst.
R21: The subject of the prior clause is the referend. I, Subst.
R22: I, Subst.
In 1.7 at the same time can be taken to introduce after the injection with the injection referential to 198.1.2 (Detach, Subst.). Relating 1 or 2 days in 1.8 to a referential occurrences of the injection poses complications, see FIS, chapter 5, section 4.2 for the considerations involved in such cases.

198.1.8

R23: Detach*, Repl = when + (22)
R24: Detach, Subst.
R25: I, Repl = Poss (25)
R26: Detach, Subst.

198.1.9

R27: The referential phrase the experiments pertains to the determination of antibody concentrations in various tissues after injection of various preparations of virus: the referend is sentences 1.3 to 1.8 (not indicated in the text; see note to 198.3.1). Under Detach*, each of the sentences is nominalized as That S and conjoined under and in order of occurrence, i.e., Conj (Nom (1.3),...Nom$_S$ (1.8)); however in 1.4 may be ignored. Experiments appears to be referential to the collection of the sentences; unless the referential is regarded as short for the results of the experiments (of experimenting), each sentence is not classified as an experiment, e.g. (1.3) that no demonstrable antibodies to...were found in lymphnodes...is an experiment is not a classifier - sentence, though That no demonstrable antibodies, were found...is a result of experimenting is.
R28: I, Subst.
The vaccine is roughly equivalent to "whatever is used as a vaccine" and is not regarded as referential.

198.1.10

R29: RelDetach, Subst.
R30: I, Repl = the (30)
R31: See remark (3) on 1.5; the referend is passim. Detach, Subst.
R32: Expansion of resulting (with the preposition from) places it in the position of the color word-class (an inverse member of that class; compare produced in 1.5, which is a non-inverse member of that word class); this determines the zero-referential (classifier) given: the antigen. A full-expansion would yield: injection of the antigen into the animals (an instance of the sentence type GJB), with

the animals a referential classifier of rabbits in 1.2. Under I*, Repl = the (32).
R33: Those is regarded as determinative. I, Repl = the (33). Those of the antibody-titers can be rewritten Those antibody-titers.
R34: The referend is either as indicated or replacement is of R33 upon resolution of the cross-reference. RelDetach. Subst.
R35: The referend (in 1.5) is strongly nominalized (under Detach), i.e., (the) use of undiluted allantoic fluid as antigen.
R36: Resolution of R35 assists in determining the referend of R36. (Note that followed in 1.10 is an inverse member, and produced in 1.5 a regular member of the colon word class). Under Detach, the adverb almost is permuted to before the adjective which it modifies; a is rewritten the, yielding the almost maximal antibody-response (in the serum).

198.1.11

R37: Detach. Repl = Nom-ing (37) = a 10-fold concentrate ...seeming to be the optimal type of vaccine (alternatively, the referend could be strongly nominalized as: The fact that (37)).
R38: The first prior occurrence of experiments (R27) is given as the referend. Further replacement, i.e., of R27, does not appear to be possible (no chain of references is established). Detach. Subst.
R39: Detach, Subst.

SEQUENCE AND EVENTS FOLLOWING INJECTION OF THE VIRAL ANTIGENS

198.2.1

A series of experiments in 2.1 can be regarded as an epiphoric referential (cf. 1981.1.), though determination of its referend is not clear. One possibility is to consider it as cross-referring to 'M' - segments (chapter 5, section 6) in the following sentences, i.e., extracts of lymphnodes were tested (2.6), analysis of the lymph (2.10), simultaneous testes with the blood-serum (2.11). The second and third components can be adjusted into (passival) denominalized forms - the lymph was analyzed, the blood-serum was simultaneously tested. The conjunction of the (adjusted) three components can be represented as: (2.6), (2.10), and (2.11), and the weak operator was undertaken (akin to a classifier of the verbs in the components) deleted. This replacement is made under the Detachment rule for epiphora; the referential is a classifier. However, a difficulty resides in the exclusion of phrases pertaining to counts of the white cells (198.2.3-5). Another possibility, supported by considerastions given under R73, is to take series as related to the series of days after injection in 2.2, i.e., the experiments are individuated in respect to the particular day after injection on which they are made. Under the detachment rule for epiphora, the referential is replaced by (from 2.2), lymph was collected..., and blood was collected from the heart at 1,2,3,...days after injection with elision of was undertaken/
R1: RelDetach, Subst.
R2: The referend, in the preceding section (198.1.10), is a 10-fold concentrate of allantoic fluids...virus. Under Detach, Repl = the (2). See also 194.2.3-5. Note that this cross-reference would support taking all subsequent experiments (198.1.11) as epiphoric to a series of experiments (as one component of its referend). This is not done here.
R3: The referential-classifier is not considered to include in its referend the adjunct on the PR8.strain... virus in that as judged...cells can be permuted (paraphrastically) to follow which. Under I*, Repl = the (3).

198.2.2

R4: Note in 2.1 the classifier-like as antigen which assists in determining the referend. Under Detach*, Repl = (the) (4).
R5: I, Subst. The referend includes R4 allowing for further replacements.
R6, R7, R9: The referends are passim. Detach, Subst. These phrases can also be regarded as introducers of zero-referentials, e.g., (of) the animals
R8: I*, Repl = (the) (8).

198.2.3

R10: The in R10 can be considered determinative as well (on this ambiguity, see chapter 5, section 4). Detach, Repl = the + 10 1/2 + wh (10 1/2) + 10 2/2.
R11: I*, Subst.
R12: Detach, Subst.
R13: In R13 (and similar referential-phrases), an expansion to a more 'complete' form isn't made. The referend, not shown in the text, is 2, 3, 4, days after injection (2.2). Under Detach, Replacement either adjusts the referend to that form given as R13: taking the ordinal forms of 2 and 4, or the preceding of is altered to from...to, i.e. from 2 days to 4 days after injection. As from and to are prepositions "introducing" phrases for the onset and terminus of the period, 3 (or third day) is deleted.

198.2.4

R14: Detach, Subst.
R15: As noted in chapter 3, section 3.23, the 9th day can itself be considered referential - including in its referend arguments under the operator. In this and a few other cases, the relevant arguments are given as zero-referentials, e.g., injection (R14) in order to indicate how sentences in the text can be regularized (by means of tacit referentials) to instances of a few sublanguage sentence-types. Here the referend in (2.2) is 9 days after injection. Under Detach, Repl = Substitution or adjustment (via "ordinalization") to the form given as R15.
R16: Detach, Subst.
R17: I, Subst.
R18: Detach, Subst. (cf. R14 for the referend).

198.2.5

R19: Expansion of R19 into the awkward form: [The days [which] were later than [the other days]] would more accurately refelect the reference made to the phrase given as R13 in 2.2. Resolution of R19 requires the band arithmetic reference from 2.3 and 2.4 to the 9th and 16th days are later than the 2nd to 4th day. Repl. under Detach = Conj. (19 1/2, 19 2/2)
R20: Detach, Repl = 20 1/4 + wh (20 1/4) + 20 2/4 + 20 3/4 + 20 4/4.
R21: those is regarded as determinative: if taken as introducing of them (them referential to the counts), R21 can be directly linked to the counts. As given, Repl (= Subst) under RelDetach yields a sentence Those had been found...rabbits in which those can be considered anaphoric to the counts.
['normal rabbits' are uninjected rabbits]

198.2.6

R22: Detach, Repl = 20 1/2 + wh (22 1/2) + 22 2/2. The replacement properly relates extracts to was excised (in 2.2). In 2.2 at 1, 2, ... days after injection can be included as a third component of R22. This would explain the plural extracts in R22 (different popliteal lymphnodes are excised at each day after injection)
R23: As noted above (Note R84.5 in Methods) it is questionably referential. Replacement under I requires substitution of a local synonym, e.g., was discovered, for was found. The resulting sentence is of low acceptability due perhaps to the length of the referend phrase.
R24: R24 is alternately (in) that place with Repl (under I) = Subst. (or in (24) = Repl. under I)
R25: Detach*, Subst.
R26: cf. R14 Detach, Subst.
R27: The referend in 2.2 is 2 days after injection. Detach, Repl = Subst (cf. R15 on an alternate adjustment)

198.2.7

R28: Detach, Subst.
R29: Detach, Subst. The referend is itself a referential phrase - see Note to R22.

198.2.8

R30: Detach, Subst. The referend could be given as R28 given its prior resolution. Days subsequent to that day could itself be considered referential to 3, 4 days after injection (in 2.2), see R34.
R31-32: Detach Subst. cf. R24.
R33: cf. R14 Detach, Subst.
R34: On expansion of R34 (and the zero-referential R33), see Note to R15. The referend in 2.2 is 5 (days) and 7 days after injection (conjunction under and is an adjustment). Detach, Subst.

198.2.9

R35: Detach. Subst. Replacement of the referend, given here as R29, is subject to restrictions imposed by R36 - 37; subsequent replacement of the extracts of lymphnodes refers to the popliteal lymphnode (which) was excised after the 5th or 7th days after injection.
R36, 37: In the text, the 5th or 7th day in the article is expanded. Under Detach, the referends - 5 days after injection, 7 days after injection (2.2) respectively are substituted.

198.2.10

R38: This referential is a classifier of the numerals given in 2.2, e.g., 2 days is an interval (after injection). The referend (in 2.2) is 1, 2,...days after injection. Detach*, Subst.
R39: Under Detach, Repl. is as in R10 (with replacement of R38).
R40: The referend should be determined upon completion of 2.10. The complement of showed in the text (i.e., sentence 2.10 minus reconstructed referentials) states the "respect" in which the lymph is similar. Next to clauses in 2.10 are listed the relevant preceding sentences comprising the referend (parentheses enclose replacements).
2.10 no measure amount of antibody in (the lymph) before the 2d day: 2.6. antibody could not usually be detected in (the extracts of lymphnodes) before the second day following injection of the antigen.
2.10 low titers of antibody in (the lymph) on the 2d or 3d day: 2.7 on (the second day following injection of the antigen), antibody could generally be found in the extracts of lymphnodes in low titer.
2.10 an increasing titer of (antibody) in later days: 2.8 in subsequent days (subsequent to (the second day...)) the level of antibody-titer rose in (the extracts of lymphnodes). As can be seen the similarity is not an exact one, e.g., the modifiers generally, usually in the referend -sentences, differences in titer specification for the third day after injection. Adjusting the referend-components from 2.6 and 2.7 requires noting that the modal could (which has no nominalized form) and be can be replaced by is without change of meaning (as determined by judgments of informants). With this preliminary alteration, each component is weakly nominalized (Nom-ing) with a permutation of on the second day... (in 2.7) and of in subsequent days (in 2.8) to the end of the respective components. Prior replacement of referentials corresponding to the parenthesized phrases is assumed. The adjusted components are then conjoined as: Nom-ing (2.6), Nom-ing (2.7) and Nom-ing (2.8). The result of replacement under Detach is similarly to antibody not usually being detected..., antibody generally being found..., and the level of antibody-titer rising... Perhaps on the basis of this replacement, R40 can simply be replaced by the extracts of lymphnodes (see chapter 5, section 2 for related discussion)
R41, R43: I*, Subst.
R42, 44: The referend is in 2.2 (2 days after injection). Detach. Subst.
R45: The referend in 2.2 is 3 days after injection. Detach. Subst.
R46: I, Subst.
R47: I, Subst. Days later than the 2nd or 3rd day could be taken as referential to the appropriate phrase in 2.2. given a tacit arithmetical sentence, e.g., 4, 5,... after injection are later than the 2nd or 3rd day.

198.2.11

R48: The referend is in 2.2. Detach. Repl = 48 1/2 + wh (48 1/2) + 48 2/2.
R49: R49 can also be given as other tests. The referend components are the extracts of lymphnodes were tested (in 2.6) and analysis of the lymph intervals (in 2.10). Repl under Detach = Conj (Nom$_S$ (49 1/2) = Tests of the extracts of lymphnodes, (49 2/2)).
R50: I*, Subst.
R51: cf. R45.

198.2.12

R52: Here can be rewritten as in this place with this place referential to R48. Alternately, Repl = in (48) under Detach.
R53: The phrase given as R53 is not clearly referential to the referend indicated. If referential, it may have as its referend an implicature (implication) of the preceding sentence: from no measurable amount of antibody was present usually before the 3d day (in 2.11), there is an implicature that a measurable amount of antibody was present on the third day. If a measurable amount is equivalent to low titer, in lower titer is part of the referential phrase (if not, in low titer is an unrestrictive adjunct). With the cross-reference indicated, Repl = Subst under Detach.
R54: I, Subst. (the object of rise is R52)
R55: The adverb again and the cross-reference established by way of its occurrence in 2.12 requires a lengthy discussion. As noted in GEMP (408 fn. 7) again is among those adverbs that "imply a second sentence" (another, of which there are several occurrences in the article, is accordingly). It is noted that "These words may be derivable from operators whose zeroed second argument was a sentence [or, in the analysis here, a pro-sentential referential, e.g., this] or was attached by semicolon to a sentence. However, the details of finding an adequate source and of establishing the zeroability of the second argument are very difficult". For accordingly, a source such as in accord with this appears to be adequate for the occurrences in this article (chapter 5, section 2). With again, there are several complications. To note just two, consider firstly the text: John went to the store. On Tuesday, he went (to the store) again. In the text given, again signals a prior occurrence in time. In the article-sentence again signals a prior occurrence in the order of the text and is 'metatextual' or metalinguistic as is the case with occurrences of the latter (chapter 1, section 4). Secondly, if to the text just given a sentence is added, e.g., On Friday, he went (yet) again, again has the sense of 'once more', implying a prior recurrence, i.e., loosely, again can "iterate". This is the case with again in 2.12 which indirectly makes reference to similarly in 198.2.10.

Pending resolution of these difficulties, again in the present instance might be rendered: as with the preceding cases. In 2.12 preposing here and again has the remainder of the sentence giving the pattern of antibody appearance said to have recurred. In respect to the referend: in 198.2.10 one can isolate (with reconstructions and replacements given in parentheses) the relevant passage: low titers of antibody are present (in the lymph) on the 2d or 3d day, and an increasing titer (of antibody in the lymph) in later days. By means of similarly in 198.2.10 one can note the relevant portions of preceding sentences (with replacements in parentheses): from 198.2.7 - On (the second day following injection of the antigen) antibody could generally be found in the extracts of lymphnodes in low titer); from 198.2.8. - In subsequent days the level of antibody-titer rose (in the extracts of lymphnodes). In each case, i.e., (group of) sentences stating the pattern of antibody appearance in lymph and lymphnode-extracts, it may be inferred that after the appearance of antibodies in low titer, there was a continuous rise (inclusion of continuous in 2.12 is an interpolation from the sampling points and may be assumed in these cases as well). The inferences are, roughly, made by (1) noting the synonymy - relation among rise and increasing (presence), cf. chapter 2, section 3.3 (2) the "synonymy-relation" between later than (or: subsequent to) to after.
(3) a rule of consequence, schematically stated as: S_1 (nth day), S_2 (nth + i day, i > 0), n thti (day is after nth day $\rightarrow$ after S_1 (- nth day), S_2 (- nthti day)
Replacement requires prior resolution of a number of referentials occurring in the components given as the referend and adjustments including 'replacement' of could in 198.2.8 (cf. R40), Nom-ing of the sentences, and Conj. The resultant (under Detach) is: As with low titers of antibodies occurring in the lymph on the 2nd or 3d day and an increasing titer of antibody in the lymph occurring on later days and as with antibody being generally found in extracts of lymphnode in low titer on the second day and in subsequent days the level of antibody titer rising, here after the appearance of antibodies in low titer there was a continuous rise. As with occurs twice, once for each recurrence.

198.2.13

R56, R57: Detach, Subst. As noted in Chapter 3, section 3.1, it is not clear under what conditions a compound-noun can be taken to introduce a zero-referential.
R58: First in R58 introduces a zero-referential - the first 4 days of the days (after injection) - not indicated in the text. The referend in both cases is in 2.2: the days (after injection) cross-refers to 1, 2, 3, 4, 5, 7,...and 15 days after injection; the first 4 days to 1, 2, 3, 4 days after injection. Repl under Detach in the former is Subst.; in

the latter case, under Detach and is introduced between 3 + 4.

R59: The corresponding days refers to that which corresponds but doesn't itself state a correspondence. Thus R59 is not expanded into the days corresponding to each of those days. As a correspondence is loosely a pairing between members of sets, Repl under I = each of (59). Each of the first 4 days itself can be considered referential to the phrase given in R58.

R60: R60 can clearly be expanded. Given the replacements above (R58 - R59), the referends can be indicated as phrases in 2.2, e.g., for the lymphnodes of the corresponding days, successive replacements yield the popliteal lympnhode which was excised at 1 day after injection, the popliteal lymphnode which was excised at 2 days after injection,....(under Detach). Note that even with these replacements the sentence does not accurately render the ostensible intent of the sentence: a correspondence is effected between days, but not between the tissues of the appropriate days. As in the succeeding sentences (some with respective), corresponding seems to be called upon, incorrectly, to effect both correspondences. The intent of the sentence could be rendered by stating it as: The serum-titer at 1, 2, 3 and 4 days after injection...lagged behind the antibody-titers of the lymphnodes at 1, 2, 3 and 4 days respectively and the serum titer at 1, 2, 3, and 4 days after injection...lagged behind the lymphs at 1, 2, 3, and 4 days after injection days, respectively where respectively metalinguistically coordinates lymphnodes of the first 4 days to the appropriate (matching) serums of the first 4 days and similarly with the lymphs.

198.2.14

R61: Under Detach, the referend(s) in 2.2 are substituted - 5 and 7 days after injection.

R62: Detach, Subst.

R63: I, Subst.

R64: The text-segment indicated in double early-brackets contains a slight error which is corrected in the expansion: in the text, respective does not distribute over or as is intended. Even with the expansion given, it is not clear whether the sentence accurately renders what is intended: antibody-contents of the serum are paired with those of the lymphnode and those of the lymph in respect to the days after injection; thus respective can be said to announce R64 and R66. In both cases, under I, Repl = Substitution. However, in this event, an (intended) correspondence between serum (titers) and lymphnode-titers for the relevant days is not made (likewise for the correspondence however serum titers) and lymph (titers), cf. R60. Respective may however be playing both roles here: as an announcer of those days and as coordinating the various tissues of those days. The sentence as 'intended' can be written: By the 5th and 7th

days the antibody-content of the serum was greater than that of the lymphnodes of the 5th and 7th days respectively and by the 5th.....that of the lymph of the 5th and 7th days respectively
R65: Given replacement of R64, the referend in 2.2 is replaced under Detach as: the popliteal lymphnode which was excised at 5 and 7 days after injection
R66: cf. R64.
R67: The referend in 2.2 is replaced under Detach as lymph which was collected from the efferent lymph-vessels at 5 and 7 days after injection.

198.2.15

R68: Detach, Subst.
R69, R70: Detach. Subst. (cf. R56-57; the serum-titer can itself be considered referential to the antibody-content of the serum in 2.14)
R71, 72: The zero-referential announced by the comparative can alternatively be rendered as the other tissue titers. Titer in the sublanguage occurs as a higher operator of a frequently appropriately zeroed operator present in and so could be construed a referential to the arguments of that zeroed operator following chapter 3, section 3. (See also FIS, chapter 5, section 4.2 on the zeroing of present in under titer). Reconstruction of R71-72 may be more perspicuous. Repl of R71 under Detach* = Subst. The referend of R72 is given in 2.13 (rather than the neighbouring 2.14) for simplicity of replacement = Subst under Detach.
R73 - 74: As mentioned above in the note to 198.2.1, experiments are differentiated in respect to the day after injection (on which they occur). For the duration of the experiments can be proposed to the head of the sentence, again indicating the reference to days after injection. Given R58, R74 might be stated as the remaining duration of the experiments. R73 with some awkwardness is replaceable by the 2.2 referend: 1, 2, 3,...and 15 days after injection. The (remaining) duration of the experiments (i.e., the duration of the experiments remaining (from after) 5 and 7 days after injection) has its referend in 2.2 and is replaceable under Detach* by from 5 and 7 days after injection to 15 days after injection (for is deleted; from...to are prepositions "appropriate" to the classifier duration - a duration is from X to Y)

198.216

R75: R75 raises some interesting questions. If R75 is taken as referential to particular preceding sentences, Fig 1. "shows" these in a rather indirect way. The sentences comprising the putative referend (see below) contain adverbial modifiers such as generally, usually, almost always which pertain to the data from which the geometric mean antibody-titers represented in the figure are derived.

Assuming specific sentences of the text comprise the referend, note that the quantitative relations concern amounts of antibody in various tissues on different days after injection: sentences 198.2.6-9 do not mention relations among tissues whereas 198.2.10 via similarly and 198.2.12 via again do as do 198.2.13-14. In the replacement it is assumed that referentials in some of the referend-components have been resolved; the components, indicated below, are nominalized as that S and conjoined under and (are in 2.16 is adjusted to is): That the lymph collected at...similarly to...showed no...later days (from 198.2.10. See R40 or replacement of similarly to this) and that in the blood-serum as with...and...after the appearance...rise (from 198.2.12, see R55 on replacement of again) and that (198.2.13) and that (198.2.14) is shown...

Alternatively, R75 is not referential to these specific sentences but to a generalization of them, roughly stateable as Antibody is present in different amounts in various tissues at different times after injection and replacement is of a strong nominalization of this sentence; e.g., The presence of antibody in different amounts... The proposal obviously needs to be worked out in detail, e.g., how classifiers are used to establish the generalization.

R75 also indirectly makes reference to sentences "derivable" from figure 1 (see chapter 3, section 2).

R76: RelDetach, Subst.

R77: Detach, Subst. See 198.2.1. for the referend experiments performed....type A might also be considered referential - see Note to 198.2.1 and to R73-74.

198.2.17

In 2.17, tacit referentials, e.g., of the tissues (folowing titer) can be established to the figure 1 caption: Geometric Mean Antibody-Titers of Lymph, Lymphnode-extract, and serum at various intervals Following the injection of inactivated influenzal virus into the foot pad. Per (= for each) interval represented refers to sentences obtainable from the figure (and caption), e.g., 2 days is an interval after injection (chapter 3, sections 1-2).

R78: The zero-referential is announced by represented. Detach, Subst.

198.2.18

R79: The referend is passim. Detach. Subst.

R80 - R81: Under one reading of 2.18, it states a contradiction: R80 in this reading cross-refers to 9 and this introduced by the comparative also does; replacement yields nine was smaller than nine. R80 is thus taken to cross-refer to an average, Repl under Detach* = the (80). R81 is replaced by its referend nine under Detach. The resulting form is: ...The average was smaller than nine... Specimens does not introduce a zero-referential, given the

(permutable) PN-phrase in the case of the lymph.
R82: I, Subst.
R83: Case is a classifier (cf. the preceding non-referential occurrence). Detach*, Subst. Use of case and instance in the succeeding sentences as referential-classifiers is connected to the statement of regularities in these sentences.

198.2.19

In 2.19, rabbits where lymph,...were obtained could be considered as anaphoric to a sentence which follows from 2.17 and 2.18, i.e. There are rabbits from which lymph, extracts of lymphnodes, and serum were obtained. A tacit sentence may be involved as the specimens of lymph while smaller than nine are assumed to be greater than zero.
R84: The referend is the preceding from rabbits Rel Detach, Subst. The referend PN-phrase can be permuted to the end of the secondary sentence.
R85: cf. R13
R86: I, Subst.
R87: cf. R13
R88: The referends are in 2.2, Repl under Detach yields the popliteal lymphnode which was excised at 2, 3, and 4 days after injection and blood which was collected from the heart at 2, 3, and 4 days after injection; collected serves as a "classifier-like" verb for excised

198.2.20

R89: Detach*, Subst.
R90: Repl of the referential-classifier differences under Detach* requries an adjustment in 2.20: the referend indicated is not a nominalization; thus were quite marked, as a modifier on higher is adverbialized, yielding the antibody-content...was quite markedly higher than...days.
R91: Under I, Repl = the (89). The referend is itself a referential allowing for subsequent replacements.
R92: Repl. is parallel to that in R90 (under Detach*). Here, however there is no adverbial form for small: a local synonym, without that restriction, e.g., slight, can be used instead, yielding the antibody-content...was slightly higher...days.
R93: I, Repl = the (93), cf. R91.
R94: Repl is similar to that in R90 and R92. The singular form this difference is used presumably as it is the property of having differences which is stated to not be apparent. Adjustment in 2.20 yields the antibody-content... was not apparently higher than...days.

198.2.21

R95: All is included in the referential phrase as it is the closure of those phrases referred to by the referential-classifier these cases (see Note to R83 on the use of case). The referend, which has several components, is in the previous sentence. Briefly, Replacement under Detach* excises animals in the first clause and converts the remainder of the sentence into an adjunct, with a change of the determiner some to the: the animals in which the differences were quite marked, and makes similar adjustments in the second and third clause. The thus adjusted components are then conjoined under and.
R96: Detach. Repl = 96 1/2 + 96 2/2. extract in R96 is accounted for in terms of the second component of the referend (96 2/2), see Note to R88.
R97: I, Subst.
R98: on the analysis of corresponding, see Notes to R59-60. Detach. Repl = each of (98). In the instance, however, prior replacement of R96 allows one to consider the corresponding serum as the corresponding serum collected in the 2d to 4th days; the adjunct is repetitionally reconstructed given the second referend-component of R96. If the analysis is correct, corresponding functions as a metalinguistic coordinator pairing lymphnode-extract (titers) and serum (titers) of the appropriate days (akin to respectively) and the problems of obtaining the intended correspondence noted above do not arise.
R99: Detach. Repl = 99 1/2 + 99 2/2, cf. R88.

198.2.22

R100: RelDetach. Repl = in + (100)
R101: I, Subst.
R102: The referend is that given as the referend of R96, as will be shown below. Detach. Subst.
R103: The referend occurs in 2.20: others (of them) the differences were small. This is seen more clearly perhaps when the referntials in the referend are resolved (cf. Notes to R91, R92): replacing R91-92 yields (in) others of the animals the antibody content of lymph collected in the 2d to 4th days was slightly higher than that of the lymphnode or serum collected in the 2d to 4th days (the animals may in turn be replaced by the referend given for R89). Not markedly is synonymous here with slightly (chosen in the absence of small-ly). The form of the restrictive adjunct in 2.22 where...lymphnode supports the replacement given for R92: it is close to the form assumed upon replacement of R92 but for the difference between not markedly and slightly and the mention of serum in R92's replacement. Replacement of R103 requires prior resolution of R91: under Detach*, others of the animals is excised from the clause and the remainder appended as a secondary sentence, i.e., in others of the animals in which the differences were small. Others is pre-

ceded by those; alternatively, others of can be replaced by those. Note finally that R103 refers, via the intermediate referential R92 contained in the referend of R103, to the entire replacement of R92 and not just to that segment of it which states that lymph-titers are higher than that of the lymphnode (cf. the restrictive relative in 198.2.22 where the titer...lymphnode). It is by way of the replacement of R92 that the referend of R102 is determinable as well as those of R104 and R107-108.
R104: cf. R102 and discussion above.
R105: On the analysis of nevertheless, see GEMP.396.
Under I, Repl = Nom-ing (105) = the titer of antibodies not being markedly higher....lymphnode.
R106: I, Subst.
R107: on corresponding, see Notes to R59-60, R98. The referend is determinable-given the replacement of R92 contained in the referend of R103 - as that given for R98. with Subst under Detach. As in the case of R98, an alternative analysis of the corresponding serum is available. Replacement of R104 allows us to consider the corresponding serum as the corresponding serum collected in the 2d to 4th days (cf. R98).
R108: The referend is that given for R99 (See Notes to R103, 107).
After the two occurrences of the titer in 2.22 (of) the antibody can be reconstructed with the referend an occurrence of antibody (passim) in the section. (Detach, Subst)

200.1.1

R109: The in R109 appears to signal both an anaphora to the referend given for R89 and an epiphora to (the numbered) rabbits in succeeding sentences of this paragraph. In the first case, Repl = Subst. under Detach*; in the second, under Detach* for Epiphora: rabbits 328, 317, 341, 330, 316 (from 200.1.2), rabbit 340, 214 (from 1.3) are conjoined and then replace R109. (see below)
R110: R110 is epiphoric to specimens from rabbits showed... rabbit 316 (from 200.1.2), rabbit 340 illustrates an instance...similar (from 200.1.3), in rabbit 214...collected (from 200.1.3): each component is nominalized as that S and then conjoined under and. Detachment* for Epiphora.

Note that components of the referend are an exemplification of the range of individual variation among the experimental animals (see chapter 5 section 4 -- on epiphora). The referends excerpt material given in Table II (or consequences of sentences derivable from the Table, chapter 3, section 2). While the phrase given as the referential is not composed of other referential phrases; it contains classifiers of particular phrases in the components of the referends. The experimental animals has been noted above as a classifier of rabbits 328, 317, etc. Individual variation, loosely classifies greater differences in 1.2 and were similar and greater in 1.3, i.e., it per-

tains to differences in titer concentrations among tissues drawn from the same animal; Range loosely refers to the extent of differences. The classifiers show among themselves the same operator-relations as do the phrases which they classify.

200.1.2

R111: Detach, Subst.
R112: cf. R23 above and references made there. Substitution of a local synonym for seen, e.g., noticed, allows for Repl under I = Subst. though the length of the referend phrase accounts for a resultant of low acceptability.
R113: I*, Subst.
R114: Repl (under I) requires either a preliminary adjustment in 1.2. permuting did to follow rabbits 330 and 316 (see GEMP section 3.15)
or the permutation of (114½) + 114 2/2) to this position is considered part of the replacement.
R115: I*, Subst.

200.1.3

R116: Though the referend (antecedent) of where is clearly an instance, the referend is a classifier of the preceding rabbit 340 which can substitute for it in the Repl (under RelDetach) in (116).
R117: I, Subst.
R118: As noted in R10, the may be considered determinative. If anaphoric, the referend is in 198.2.19 lymph collected in the 2d to 4th days with Repl (under Detach) = Subst. The referend is established by noting that R109 is anaphoric to 198.2.19 and that rabbit 214 is among the phrases referred to by R109.

HISTOLOGICAL CHANGES IN THE LYMPHNODE

200.2.1

R1: The referend is passim. Detach. Subst.
R2: The referend occurs in a previous section (198.2.2): the antigen was injected into the foot-pads of a suitable number of rabbits. Detach, Subst.
The uninjected leg is questionably referential - there is no available referend, although it disambiguates the referend of R2 above which does not indicate whether one or both of the foot pads is injected. Given the correct reading, the referend could be rewritten...into one of the foot-pads... If this then has the "implicature" that the other foot-pads were not injected, the "implicature" along with the assumption - foot-pads are parts of legs could be entered and a referend - a leg of...rabbits was not injected could be obtained for the uninjected leg.

200.2.2

R3: Peak is a classifier, not of a single value but of a range of values, which requires an adjustment. The rule of inference is Detach*. Repl = (the) 3 1/3 + 3 2/3 + wh (3 1/3) + 3 3/3. Inclusion of the latter 2 components relates the occurrence of peak the weight of 2.1 is included in the 3d component, it is preferably repetitionally zeroed in the replacement, from...leg could also be taken as part of (3/3) In 2.2 was is changed to agree with the plural weights...: Pl(ural) was = were
R4-5: cf. R2
R6: Detach. Subst. (The referend - the popliteal lymph-nodes can optionally be followed by the sentence 2.1 with the popliteal lymphnodes pronouned by which: the popliteal lymphnodes the weight of which increased progressively...; the weight of may be zeroed in the resultant as a repetition.
decline might be considered as announcing a zero-referential from + referential phrase with the referend being that given as 3 1/3. However, inclusion of 2.1 (minus the popliteal lymphnodes) as a wh - adjunct on the popliteal lymphnodes would make this redundant.

200.2.3

R7: cf. R2.
R8: The proximate referend, itself a referential phrase, is indicated. Detach, Repl = Subst. Replacement can be taken to include indication (by brackets and superscript) of the referend's referential status inherited, permitting further replacements (compare R2 where the referend includes a referential phrase the antigen with its referend in 198.2.1 - an inactivated preparation of the PR8 strain of influenzal virus)

R9: Rel Detach, Repl = Nom(9) = that S. That the referend is of sentential form is indicated by the predicate noun, the external evidence of... which is a classifier of particular sublanguage sentences.
R10: I, Subst. Follicular is an announcer of a body-part, the lymphnode in this sublanguage.

200.3.1

R11: cf. R2.

200.3.2

R12: From the assumptions as indicated, an inference ("modus ponens") is made: There is an enlargement of the node which is the referend. The assumption taken from the text contains what may be called a "derivative referend": marked diffuse hyperplasia of lymphoid tissue and the node in R12 could be taken as itself referential to lymphoid tissue. [It is important that the hyperplasia is marked and diffuse, i.e., due to an abnormal increase in lymphocytes; otherwise, the enlargement might be attributed to, e.g. excessive water content.]
R13: Detach. Subst (cf. R8)
R14: Rel Detach, Subst. The referend here includes the modifier great numbers of as is indicated by the predicate were not fitted into any units of organization.

200.3.3

R15: Detach. Repl = in + (15). (there alternatively could be decomposed into in + that place with the latter phrase as the referential and Repl = Subst)
R16: Detach*. Repl = 16½ + 16 2/2 (above in the referential is not considered in this work). An implicit "classifier" sentence: Large lymphocytes are young lymphocytes is needed to indicate the referend.

200.3.4

R17: cf. R2
R18: Detach. Repl = Subst. size in this article is an announcer of some tissue (-referential), see R19.
R19: The referential here is given as the previous increase (in size) with the referend itself a referential phrase (R12). Detach. Subst. Note also the synonymy = relation between increase in size and enlargement.
R20: Detach, Repl = in + (20)

200.3.5

R21: Detach. Subst. (The referend contains a referential, R17, cf. R8)

200.3.6

R22: cf. R2
R23: Detach. Repl = the (23 1/3) + (23 2/3) + wh (23 1/3) + (23 3/3) (alternatively, into + which could be rewritten where), i.e. the circular areas into which there were beginnings of groupings of small lymphocytes. Inclusion of on this day (in 3.5) in the third component would-without prior replacement of R21 - result in R21 being taken - mistakenly as referential to fourth day in 3.6.
R24: cf. R2.
R25: Detach, Subst.
R26: I, Repl = the 26 1/2 + wh (26 1/2) + (26 2/2); clearly defined in R26 is related to the occurrence of clearly recognizable by inclusion of the second referend component.
R27: the in the lymphocytes is regarded as determinative and so announces a (reduced) appositive present there; the lymphocytes is not referential as different lymphocytes, obtained from rabbits sacrificed on a later date are in question. I, Repl = in + (27).

200.3.7

R28: Detach*. Subst. Note the occurrence of time here as a classifier of its referend, the fifth day after the injection.
R29: Detach. Repl = Subst.

200.3.8

R30: Detach. Repl = Subst (alternatively, substitution of the referend of R28).
R31: The can be rewritten as that which is a with that referential to those preceding sentences stating the histological picture of the 5th day after injection cf. R30. The referend-sentences are conjoined by and and each of them is addressed as Nom_S = That S). Detach* and Repl. with the adjustments mentioned yields: That the larger part of the cortex consisted of nodules and that maner of the lymphocytes...and that large lymphocytes....nodules which is a histological picture remained fairly constant for a few days. for a few days modifies therefter and is not taken as an announcer.

200.3.9

R32: cf. R2
R33: Detach. Subst.

200.3.10

R34: Detach. Repl = Subst.
R35: Detach. Repl = Subst.
R36: Detach. Repl = Subst.

The nodular organization of the context might be considered as itself anaaphoric to these clearly defined nodules (of which the larger part of the cortex consisted) cf. 3.6. It may be more appropriate to take as R34's referend a segment of sentence 3.9: the nodular organization can be decomposed to the organization of the nodules with the nodules here the referend of R34 though itself referential to the presently indicated referend of R34. This is supported by the connection between increasingly indefinite in 3.10 and had begun to lose definition in 3.9. Increasingly indefinite is "comparative-like" and could perhaps be rewritten as "more (and more) indefinite" with the comparative more announcing a zero-referential. Diminished can also be considered as announcing a tacit-referential, e.g., from its previous size with its referend in 3.4 (the) further increase in size (on the third day after injection. Replacement here is complicated by the occurrence in the referend of referentials which require resolution prior to the replacement.

EXPERIMENTS INVOLVING DIFFERENT SEROLOGICAL TYPES OF THE VIRUS

200.4.1

R1: Another in R1 alludes to - but is questionably an introducer of a referential - to a series of experiments in 198.2.1; R1 cannot readily be expanded to A series of experiments other than the other series of experiments (chapter 3, section 3.1). The referential-classifier is epiphoric to sentence 4.2 and 4.4 (4.3 in this context "appears as" a parenthetic qualification to 4.2). Under the Detach* rule for epiphora, the two components are conjoined by and, and the "weak" verb was done is deleted (cf. Notes to 198.2.1)
R2: Both specificity and the reaction serve as announcers of the zero-rererential (reaction could also announce the injection). The referend is passim in the section Sequence of Events... (the PR8 strain of influenzal virus). Detach*, Subst.
R3: Specificity (chapter 3, section 3.23) with its first argument a word of class A indicates that the reaction is referential to some phrase(s) containing an occurrence of antibodies (or: antibody). No particular referend can be determined: the referential-classifier loosely refers to those phrases in the Sequence of Events... section pertaining to antibody presence in various tissues.

200.4.2

R4: The referend is passim. Detach, Subst.
R5, R6: The zero-referntials announced by the right (left) foot-pad are hardly acceptable in the positions indicated as so the N of it is (paraphrastically) rewritten as its N. Its in both cases can be replaced by the referend each rabbit adjusted to each of the rabbits' under I. Alternatively, the PN phrases (in its left (right) foot-pad) can be permuted to the front of the clause, and the double replacement of referential by referend and referend by a referential noted in chapter 1 (section 5.2) can be effected, i.e., yielding: In the rabbits' right foot-pad, each of them received..., and in the rabbits' left foot-pad 0.2 ml...vaccine.

200.4.3

R7: Respectively in 4.3 is not referential but imposes an order on the replacement of R7, i.e., under Detach*, as Conj (7 1/2, 7 2/2), and not as 7 2/2 and 7 1/2.
["do not cross-react serologically": the serum of an animal injected with one virus does not give a positive test to the other antigen, i.e., show signs of antibody specific to the other antigen]

200.4.4

R8: The definite article and collected are taken as introducers of the same zero-referential. Under Detach*, Repl = P1(8)
R9: I*, Subst.
R10: I, Repl = the (10)
In other of its occurrences, intervals announces after the injection (or, is a referential-classifier of phrases pertaining to days after injection). Such a reconstruction is not possible here, given the preceding preposition after (cf. at). Both PR8 and Lee viruses might be considered anaphoric to PR8 vaccine and Lee vaccine in 4.1 (or to 4.3 given a replacement of R7, i.e., PR8...of type A... influenzal virus, Lee...of type B influenzal virus). Alternatively, both could be constructed as epiphoric to PR8 and Lee viruses.

200.4.5

R11: The is ambiguous between its determinative and anaphoric use in R11 (chapter 5, section 4). Given the adjunct obtained the referend is noted not as R9 along with its announcer but as the referend of R9 together with were collected. Under Detach*, Repl = 11 1/2 + wh (11 1/2) + 11 2/2
R12: Under a paraphrastic transformation permuting the PN phrase to the end of the sentence, the referend of R12 can be substituted with an adjustment of found to a local synonym, e.g., discovered
R13: Detach, Repl = Conj. (13 1/2, 13 2/2). On an alternative referend, see the note to R10; on the definite article, the note to R11. The absence of number-agreement is perhaps due to the pattern being considered in abstraction from the particular virus.
R14: The referend occurs in 4.7 and is corroborated by the anaphoric referential R26. The choice of referend is also confirmed by the resolution of R16 whose referend nearly repeats that given for R14 (though resolution of R16 requries a prior determination of the referend of R14). Replacement of the referential-classifier (under Detach* for epiphora) is made upon the replacement of R15 (otherwise, the respect in which the similarity is stated is not given, and the resulting form is unacceptable as that (R15) refers to R14 and not to the referend of R14). Repl = Nom-ing (14) = The antibody - titer of the serum lagging behind that.... There is some question as to whether the referend of R14 does not include 4.6 as well: sentence 198.2.7 (= 199.0.2) states: on (the second day following injection of the antigen), antibody could generally be found in extracts of lymphnodes in low titer.
R15: I, Subst.
R16: Given determination of the referend of R14 (though, importantly, not its replacement), the referend of R16 is

clearly in 198.2.13 (= 199.0.8). The metalinguistic above is not treated here. The adjunct described above needs to be preserved in the replacement so that strictly speaking R16 should be given as the result of replacing R15 by its referend (i.e., the result of replacement again is a referential form) Repl (under Detach*) = Nom-ing (198.2.13) + which is described above. The phrase given as R14 is assumed not to have been replaced prior to replacement of R16.

200.4.6

R17: early in R17 is a predicate of 2 to 4 days - parenthesized in the article. Under I, Repl = Subst. with a change in the preposition preceding R17 to at.
R18: Detach, Subst. Received in the referend-sentence 4.2 is locally synonymous with was injected with in the sublanguage (chapter 2, section 4.2).
R19, R21: Right and left in the right (left) lymph(node) relate to the sides of injection, and can be linked with prior occurrences of right and left by establishing a referential-classifier site of injection for names of body-parts which occur as complements of operators of the J word class (see chapter 3, section 3.2). Detach*, Subst.
R20, R22: The shortened phrases PR8 and Lee are considered as referentials. Detach. Subst (cf. note to R10)
GEMP (9.66) discusses the concessive only (cf. exclusively)

200.4.7

R23: The referend, in 4.4, may be taken to include the preceding (discontiguous) the if it is assumed that some "set noun" (GEMP 5.13) collection/group of has not been zeroed after the occurrence of the. Otherwise, under Detach, Repl = the (23).
R24: I, Subst.
R25: Detach. Repl = the (24) cf. R23.
R26: The referend is sentence 198.2.13 (as noted in R16). The tense form had been can also be considered referential in the manner of GEMP 6.12 to the past tense form in the referend. Under Detach* (experience is a classifier of the referend), the tense form had "attaches" to the referend; previous on the referend-sentence is adjusted to previously; and been is dropped. The resultant is: as the serum-titer in the first 4 days had previously almost always....

200.4.8

R27: cf. R23.
R28, 29, 34, 34, 35: cf. R20, 21.
R30: I, Repl = Poss (30). The resulting form + the titer of antibody's peak (or antibody-titer's peak) can assume the compound-noun form the peak antibody-titer (GEMP 5.34)
R31: Under a permutation transformation of the clause

introduced by as to the end of the sentence, it can be replaced by its referend with an adjustment of found to, e.g., discovered, cf. R12.
R32: To obtain a referend for R32 (and R37), the implicit assumption given is made and a conclusion drawn from the assumption and 4.2. The components of the referend are: (32 1/3) a leg; in the right foot-pad of (32 2/3) and each rabbit received 0.2 ml. of a PR8 vaccine (32 3/3). Repl (under Detach) = the 32 1/3 + 32 2/3 + wh (32 1/3) + 32 3/3 (in the right foot-pad of which can be rewritten in whose right foot-pad.
R33: RelDetach, Subst. (had been in the secondary sentence can be considered a tense-referential to the past tense on received in 4.2)

200.4.9

R36: Detach. Nom-ing (36). The respect in which the two lymphnodes are similar can be stated as: containing antibodies to the heterologous virus (cf. R41, 42 in 4.10)
R37: The replacement under Detach is nearly parallel to that of R32 and yields the leg in the left foot-pad of which (= whose left foot-pad) each rabbit received 0.2 ml. of a Lee vaccine (cf. R32)
R38: RelDetach. Subst. (cf. R33)
R39, 40: cf. R20, 22.

200.4.10

R41-42: Heterologous as noted in chapter 3, section 3.23, indirectly relates to the side of injection of an antigen. 4.10 could thus be rewritten as: The level of antibody found in the respective lymphnode-extracts against the virus heterologous to it, with it referential to the respective lymphnode-extracts. R41 and R42 therefore require simultaneous replacement: two replacement-operations are made, given the two components of R41. The corresponding replacement for R42 is indicated in parentheses next to the referend-components of R41. Under Detach; the replacement can be indicated for both referentials as: Conj (41 1/2...42 1/2; 41 2/2...42 2/2), yielding the lymphnode of the right leg against Lee virus and the lymphnode of the left leg against PR8 virus.
R43: cf. R23.

200.4.11

R44: The referend of R44 includes all lower-operators (and arguments) of 10 to 15 percent in 4.10. Under Detach*, Repl = Nom-ing (44) = The level of antibody...generally being about 10 to 15 percent...antibody.

200.4.12

R45-47: The referential of both R45 and R46 has two components the right leg (in 48) and the left leg (in 4.9). In the first case, Repl (under Detach) = Conjunction of the two components with elision of leg after each, in the second, it is simply conjunction of the components. If R47 is considered a referential-classifier, replacement of these referentials is coordinated: the left leg with Lee virus as the second component of R47, the right leg with PR8 virus as the first component (the components are passim, though could be identified as R39 and R34). Detach*, Subst. The simultaneous replacement can be given as Conj. (the right leg....PR8, the left leg...Lee virus)
R48: The referend-components are: the lymphnode of the right leg (in 4.8) and the lymphnode of the left leg (in 4.9). Repl (under Detach) = conjunction of the components with deletion of popliteal lymphnode. Each popliteal lymphnode can itself be considered referential to the same referend with Repl (under Detach) = Conj.
R49: Repl = Subst. under the paraphrastic transformation: $CS_2S_1 \rightarrow S_1CS_2$ (C = conjunction, e.g., since)
R50: cf. R23
R51: I, Repl = the (51 1/2) + wh (51 1/2) + 51 2/2
In 4.12, site occurs as a classifier; tissue is a classifier of the active lymphnode though reconstruction of another tissue to a tissue other than that tissue in which tissue in its second occurrence is part of a referential phrase is questionable. The in the normal level is the definite article of "uniqueness" and is not considered referential (the is replaceable by a)

203.1.1

R52: The referend-copmponents can be given as another series of experiments (1/2) was done to confirm the specificity of the reaction (2/2) (in 200.4.1) with Repl (under Detach) = the 1/2 (rewriting another) + wh (1/2) + 2/2. R52 does not, at least directly, refer to those sentences which describe the experiments (sentences 200.4.2 and 200.4.4). Above is not considered in this description of cross-reference.

203.1.2

R53: The referend-components are passim occurrences of PR8 virus and Lee virus with Repl = Conj (under Detach). As no mention is made of sides of injection, there is no expansion made to, e.g., the virus homologous to one side of injection.
R54: Repl = in + (54) under Detach. There could be rewritten in that place with that place referential to (54) and Repl = Subst. (under Detach).
R55: The referend is passim, Detach, Subst.
R56: The referend is passim Detach, Subst.

203.1.3

R57: cf. R54
R58: While R58 refers as well to sentences derivable from figs. 2 and 3, the referend is given as the portion of the sentence within this paragraph which its classifies: antibody is seen to have appeared... (in 203.1.5). R59 is replaced first (cf. the comparable case of R15 above). Repl (under Detach* for Epiphora) = Nom = That (58).
R59: I, Subst.
Replacement of R59 by its referend yields the general pattern of earlier experiments which in turn could be taken as a referential (-er in earlier can be considered to announce than these experiments; the referend and replacement of these experiments follows the line of R52 above). Resolution of R58 and R67-68 in the referend of R58 assist in determining a referend for the general pattern of earlier experiments. This would require revision of the definition of cross-reference (chapter 1, section 5.3) so that the text is considered to include consequences of its sentences: from 198.2.7 and 198.2.11-12 one can derive the "consequence" that antibody is present in extract of lymphnodes before it is present in the serum (the scare-quotes signal a problem in respect to the adverb usually in 198.2.11)

203.1.4

R60: cf. R54
R61: Detach, Subst.
R62: The referend is given in the code to the graphs presented in figs. 2, 3: lymphnode of leg injected with Lee, serum; opposite lymphnode;... Repl (under Detach*) = the + Conjunction of the various tissue-phrases
R63: cf. R18.
R64: Detach; experiment after one can be deleted upon Subst.
R65: Detach, Subst.
R66: Detach, Nom-ing (66): The adjustment may also be given as the fact that (66)
R67: Detach; Repl = the (67) with deletion of experiment following each in 1.5.

203.1.5

R68-69: The referends are given in the figure caption to figure 2 and the codes to figures 2 and 3. They can also be taken as - for R68: the right foot-pad and the left foot-pad in 200.4.2 and for R69: the lymphnode of the right leg (in 4.8) and the lymphnode of the left leg (in 4.9). The determination of a particular component for R68 forces a corresponding determination for that of R69. Repl (under Detach*) can be given as Conj (the lymphnode of the right leg....the right foot-pad, the lymphnode of the left leg... the left foot-pad)

R70: I, Subst.
R71: The referend is passim. Detach. Subst.

CONCENTRATION OF ANTIBODY IN LYMPH-CELLS AND PLASMA

203.2.1

The comparative -er in finer can be taken as an announcer of a zero referential, e.g., the analysis above of the source of the antibodies found, i.e., an analysis of the source of the antibodies found finer than the analysis above.... No specific referend is identifiable for the reconstructed referential; recourse to an implicit sentence for the reconstructed referential; such as The preceding experiments constituted an analysis of the source of the antibodies found merely displaces the issue to that of determining the antecedent of The preceding experiments. Source in 2.1 is equivalent to site of production (FIS, Notes to article 5 of Appendix I); implicit in 2.1 is the assertion that a source of antibodies has been determined. The relevant sentence in this connection is the preceding one (203.1.5): from 203.1.5 and a number of enthymematic premises, e.g., The popliteal lymphnode is the sole node draining the site of injection, There is no action at a distance, it may be concluded that The local lymphatic tissue, i.e., the popliteal lymphnode, constitutes a source of the antibodies found.
R1: The referend is passim: loosely, those occurrences of antibody (or: the antibodies) in preceding subsections of Experimental in which is asserted that antibody is found in a particular tissue. Detach, Subst.
R2, R3: The referends are passim: specific referends can be given in 194.1.3. Detach, Subst.
R4: I, Subst.
R5: I, Subst.: R6 its is adjusted to agree with the referend in number (their) as is was, which follows R15 adjusted to were (alternatively, lymph-cells and lymph-plasma are separately replaced in 2.1 and the resultants conjoined, i.e., lymph-cells were tested for their content of antibody and lymph-plasma was tested for its content of antibody).
R6: I, Repl = the determiner each is rewritten as the. Poss (the 6)). Centrifugation in 2.1 can be taken to announce: of the lymph with the referend the preceding R3.

203.2.2

In 2.2, above is not considered in this analysis (cf. Note to R7).
R7: the referend is passim in the section headed Methods and Materials; the pattern-test in 196.2.2 can be cited as the referend. Detach. Subst. In R7, neutralization is evidentally related to neutralizing in 193.3.4; a zero-referential, e.g. the antibody, cannot - at least not easily - be reconstructed as against in the complement against viral hemagglutinins occupies the position of neutralizing

in tests of the antibody neutralizing viral hemagglutinins. [viral hemagglutinins are that part of the virus which agglutinates red cells; the term is perhaps confusing inasmuch as antibody in an animal with sheep erythrocytes is also called "hemagglutins"]
R8: Detach*, Subst. The zero-referential given is more appropriately rendered as a disjunctive the tissue/the cells as both cells and tissue-names occur as subject of have volumes - a classifier for both could be the material - though here it occurs only as a classifier of words in the T word-class (chapter 3, section 2.2).
R9: The referend is given as the preceding noun-phrase in the text (i.e.,not as the reconstructed R8). RelDetach. Subst. Subsequent permutation of the PN phrase yields a more "conventional" word-order.
R10: I, Subst.
In 2.2, here could be regarded as a higher-order referential, thus excluding it from this analysis. Alternatively, the selection of chosen enables one to consider here as referential to for a finer analysis...found in 2.1 (Detach, Subst)

203.2.3

R11: Sediment in the phrase announcing the zero-referential is related to the occurrence of centrifugation in 2.1 in a manner illustrated by several sentences of the Methods and Materials section (paragraphs 195.1-2). The "set" noun specimens is "introduced" given the occurrence of each in the announcer; the choice of specimens is supported by the nearly parallel the plasma of each specimen which follows in 2.3 (see R12 below). Detach*, Subst.
R12: Replacement of R12 by an adjusted each lymph-cell sediment would leave unclear the relation between lymph-cell sediment and lymph-plasma. The referend is thus given as the reconstructed phrase specimens. Repl (under I) = that + Poss (specimens) = that specimen's. As noted in (GEMP: 135) own can be related to the emphatic ocurrence of -self; the replacement that specimen's lymph-plasma might thus be altered to lymph-plasma of that specimen itself (the referential properties-of own deserve further consideration)
R13: In line with other of its occurrences as referential-classifiers, e.g., R1 of the preceding subsection (200.4.1), R13 the experiment can be taken as referential to that phrase in 2.1 stating operations performed on the lymph (cf. the purpose in 2.3 and for...found in 2.1). The referend has two components: the lymph collected...was separated... lymph-plasma (1/2) and each fraction was tested...antibody (2/2). Each component is depassivized (with deletion of the indefinite subject) and weakly nominalized, yielding (e.g., for the second component), testing each fraction for its content of antibody. The resulting forms are conjoined under and. Detach*.
R14, R16: The referends of R14 and R16 differ only in

their first component in 2.1 (The first component of R16 is lymph-cells in 2.1). Under Detach, Repl = 1/3 + 2/3 + wh (1/3) + 3/3.
R15: Detach*, Subst.

203.2.4

R17: Expansion of also into in addition to this requires a permutation, e.g., to after since. Detach. Subst.
R18: I, Subst.
R18†, R19: Detach, Subst. (R18† is due to a mistake in enumeration)
R20: Detach, Subst.
R21: Detach, Repl = Nom_s (21) = the (those) tests of the plasma...in parallel with the cells
In 2.4 lymphocytic extracts can be rewritten as extracts of the lymphocytes with the lymphocytes anaphoric to lymph-cells cf. R16. On reagents, see note to 197.2.1 in the Methods and Materials Section. Sentences 2.1-4 of this section "repeat" some of the sentences in 196.2, 197.1.2 of the Methods section.

203.2.5

R22: cf. R13
In 2.5, the data can classify those sentences derivable from Table I though it is not (at least readily) replaceable by them (see chapter 3, section 2).

203.3.1

R23: I, Repl = Conj (23 1/2, 23 2/2). The resultant is somewhat unwieldly given the length of the referend (alternatively, it is seen that can be reconstructed as an inverse of repetitional zeroing with two replacements made, i.e. component 23 1/2 for R23 and 23 2/2 for the reconstructed it). A local synonym of seen, e.g., observed, can be substituted for seen.
R24: Detach. Repl = in (24)
R25: The referend occurs in Table I, which following the discussion in chapter 3, section 2, can be assumed to have been converted into sentential form: PR8 and Typhoid.
Under Detach*, Repl = Conj (PR8, Typhoid)
R26: The referend, as above, occurs in Table I (though it could perhaps be given as lymph-cells in 203.2.1 above (see Note to 2.4). The content of the lymphocytes might similarly be taken as referential to lymphocyte-extract in Table I. Detach, Subst.
R27: The referend-components are given in the first column of Table I: all pertains to the conjunction of rabbit no 34, 39, 40, etc. in that column (in sentences derived from that column) classified by cases. Repl (under Detach*) conjoins these components (cf. chapter 3, section 2).
R28: I, Subst.

R29: As with R26, R29 can be taken as referential to lymph-plasma in 203.2.1 (cf. R14 Note) or to the occurrence of the synonymous lymph-supernate (chapter 2, section 3.3) in the transformed table. Detach. Repl = the + (lymph-supernate)
R30: Detach*, Subst.
R31: Detach, Subst. Upon replacement is greatest as an operator on higher is rewritten as highest; than...tissue, connected to the comparative, is thereupon zeroed.
R32: To discern the referend for R32 requires examination of the (transformed) table and arithmetic calculation of the difference in titers between lymphocytic-extract and lymph-supernate. The same specimen in this connection may pertain to the lymphocytic-extract and lymph-supernate being obtained from the same rabbit (the same specimen of lymph from that rabbit): this too may be regarded as an inference made from the transformed table. Resolution of R32 also requires a tacit sentence: 3 days after inoculation is earlier than 5 and 7 days after inoculation. The referend 3 days after inoculation is Subst. under Detach* with alteration of in in 3.1 to at. The use of the plural days in R32 is perhaps to be explained by the fact that the several occurrences of 3 in the table are referred to, i.e., data are given for each individual rabbit at, e.g., 3 days after inoculation (cf. chapter 3, section 2).

203.3.2

R33: The referend is the preceding text-sentence. Detach. Repl = Nom-ing (3.1) = it being seen that....
R34: Detach*, Subst.
R35: The referend is taken as the lymph collected...in 203.2.1. Detach. Subst. Alternatively, it can be given as lymph in the transformed table. (Detach. Repl = the + (lymph).
The zero-referential introduced by correspond is not clear nor is the referend - the former is given as these cases. The referend (in 2.1) can be given as all cases (= 1/4), in (= 2/4), the titer of antiviral antibodies (= 3/4), and is higher than...specimen (= 4/4) with Repl (under Detach) = the (1/4) + 2/4 + wh (1/4) + (3/4) + (4/4).
R37: RelDetach, Subst. The referend agrees in number with the following are in 3.2. This study is considered a meta-linguistic referntial and so is not analyzed. The preceding counts is determinative.

203.3.3

R38: The referend is 3.2 (minus also). Detach. Nom-ing (38) - The table giving....
R39: I, Subst. (cf. Note to R23)
R40: Detach, Repl = in (40)
R41: The referend, given in a (transformed) Table I, is leg. Detach. Repl = the + leg (the referend could on the basis of the table be specified as the right (left leg).

On the introducer local, see chapter 3, section 3.23.
R42: As indicated by the referend of R43, the local lymphatic system - in contrast with other of its occurrences, e.g., in 203.1.5 - does not refer to some occurrence of lymphnode or the like but to the tissue phrases given in Table I; i.e., lymph, lymph-supernate, and to lymphocytes in that table. Detach*, Repl = The + Conjunction of these phrases.
R43: The referential-classifier is epiphoric to the comp;onents indicated concentration of antibody and cell-count in efferent lymph and - perhaps as a consequence of the epiphora - can be considered as anaphoric to related phrases in sentences obtainable from Table I. Repl under I* = the + (Conj (43 1/2, 43 2/2)). In 3.3 both in terms of is deleted.
R44: both is here taken as epiphoric to the phrases conjoined under and. I, Subst.
R45: I, Subst.
R46: RelDetach. Subst.
R47: The referential-classifier has its referned in sentences obtained from Table I: this can be identified as rabbit no. 34, rabbit no. 36 and rabbit no. 38. Under Detach*, Repl = conjunction of the referend phrases.
R48: I, Subst.
R49: Under I, the referend 2-fold concentrated adjusted to the nominal form a 2-fold concentrate, antigen in 3.3 classifies both allantoic fluid and PR8 and Typhoid in Table I.
R50: Resolution of R49 together with a simple calculation permits resolution of R50 in a manner parallel to the resolution of R47. The referend-components are rabbit no. 39, rabbit no. 40, and rabbit no. 42. cf. R47.

DISCUSSION

204.1.1

R1: The definite article in R1 can be construed as either anaphoric or determinative. If anaphoric, the components of the referend are sublanguage-sentences (or: sentence-fragments) of prior sections under the heading Experimental. Each component - suitably adjusted under various nominalizations or as is - can be classified by is a datum. Under Detach*, the (adjusted) components are conjoined under and (or: comma intonation); show in 204.1.1 is pluralized to agree with the replaced plural subject. It is presumed that in a number of these components various referentials (and zero-referentials) have been replaced. Due to the length of the referend, the result of the replacement is clearly unacceptable, but might be considered grammatical, i.e., analyzable within terms of an operator-grammar of English.
R2: I*, Subst. cf. below on the local lymphatic system as itself referential.
R3: I*, Subst.
R4: I, Subst.
In 204.1.1, a general burst of activity of the local lymphatic system is clearly a classifier of, and perhaps referential to the phrase following characterized by in this sentence. Substitution of this phrase for a general burst of activity... with deletion of characterized by does yield a consequence of this sentence (under I), though the justification for the deletion is not clear - if justified at all. Some support for the referential interpretation is that the putative referend is an "exemplification" of the referential, a semantic relation frequent in instances of epiphoric cross-reference (chapter 5, section 4). In like fashion, the local lymphatic system can be construed as epiphoric to the succeeding occurrences of "tissue" phrases (phrases in the word-class T; chapter 2, section 3.1) - the sole draining...area, the efferent lymph, as well as to lymphocytes (by means of an implicit sentence, e.g., Lymphocytes are part of the local lymphatic system). Replacement of the putative refential by these phrases in 1.1 conjoined under and (under I*) may be said to not yield a paraphrase inasmuch as system pertains to these tissues as well as determinable relations among them, i.e., as a system might thus be appended to the conjoined "referends" (cf. 206.1.1 of the Summary)

204.1.2

R5: Detach, Subst.
R6: Detach, Repl = the (6)
R7: RelDetach, Subst.
R8: Following GEMP: 71, then is rewritten: (just) after that with that anaphoric to the discontiguous phrase indicated (alternatively, insertion of after can be regarded as

an adjustment). Replacement (under I) = Substitution, assuming repetitional reconstruction of the subject of becomes; without this reconstruction, Repl = Nom-ing (8 1/3 + 8 2/3 + 8 3/3) with repetitional zeroing of the first component, i.e., being diffuse.
R9: Detach, Subst (cf. 206.1.3 in Summary)

204.1.3

R10: Detach, Subst. See chapter 5, section 5 on determination of the referend.
R11: Detach*, Subst.
R12: Detach, Subst.
R13: I, Repl = 13 1/3 + 13 2/3 + wh (13 1/3) + 13 3/3. The first component of the referend is itself referential (R12) allowing for further replacements.
In 204.1.3 the lymph....that node may be regarded as anaphoric to the efferent lymph...that node in 1.1, which would establish a relation between emerging and efferent in the respective phrases.

204.1.4

R14: Detach*, Repl = Conj (14 1/2, 14 2/2)
R15: The first component in 1.3 is antibodies to the viral protein injected; the second, the remainder of 1.3. Repl (under Detach) = The + 15 1/2 + wh (15 1/2) + 15 2/2.
R16: Detach, Subst.
R17: Detach, Subst. FIS chapter 5, section 4.2 discusses how the temporal modifiers which introduce R16 and R17 can be shown to relate to an "injection" sentence. The claim that they are so related is corroborated by examining earlier sentences of the text to which these are related, chapter 5, section 5.
R18: Detach*, Subst. The blood-serum may instead be itself considered referential to passim occurrences of the serum in the section Sequence of Events... (cf. 198.2.13)

204.1.5

R19: The referend-components occur passim in 197.1: they are the pattern-test and the sedimentative-test (or: their synonyms). Repl (under Detach*) conjoins the components under and.
R20: From the assumption given in 200.4.8 and 204.1.1 (inactivated influenzal virus was injected...rabbits), the consequence given is obtained by instantiation and "modus ponens". Repl (under Detach) = the 20 1/3 + 20 2/3 + wh (20 1/3) + 20 3/3
R21: RelDetach, Subst.
R22: Detach*, Subst.
R23: Detach, Subst.
In 1.5, the first occurrence of influenzal virus may be said to have a zero-definite determiner and thus be referential to inactivated influenzal virus in 1.1. (Detach, Subst)

204.1.6

R24: R24 is ambiguously referential either to: a) following the injection...node in 1.1, 204.1.2, 204.1.3, 204.1.4, and 204.1.5 or to b) the referend-components noted for R1 above. In the former case, each component, adjusted to Nom (S) = that S, is classified by is an observation and their conjunction (under and) by is a set of observations. Repl (under Detach*) conjoins under and the nominalized components. For the latter case, see Note to R1 of this section.
R25: Detach, Subst.

204.1.7

R26: Detach, Subst. As mentioned above (see Note to 197.3.1), use in this environment is a sublanguage - synonym of injection. Infectivity can be rewritten as - the capacity of the antigen to infect the animals (or: the tissues) with the antigen referential to influenzal virus and the animals referential to rabbits in 1.1 (or: the tissues referential to the local lymphatic system in 1.1). Detach*, Subst (in both instances)
R27: I*, Subst.
R28: In 1.7 those is considered determinative. Repl of R28 (under I) requires that group of proteins be repetitionally reconstructed after those in which case the referend can be given as the group of proteins of viral agents (I, Subst) or deletion of those of upon Replacement (= Subst, under I). If R28 is expanded to a group of proteins other than the other (or: that) group of proteins, an implicit sentence, e.g., Proteins are contained in bacterial and other cellular agents, is required to obtain a referend.

204.2.1

R29: I, Subst.
R30: RelDetach, Subst.
In 2.1, another system of...tissue could be expanded to a system...other than the system of lymphatic tissue above with the zero-referential anaphoric to, in 1.1 the lymphatic system local to the foot-pads (assuming prior resolution of R2). Also, in contrast with other occurrences (e.g., R91 in Methods & Materials (196.1.6) and R38 in concentration (203.3.3) cannot be rewritten as in addition to this or the like: it is left unanalyzed. The in the rabbit is considered "generic" - the can be rewritten as a with no noticeable difference in the reading of the sentence.

204.2.2

R31: Detach, Subst.
R32: I*, Subst.

204.3.1

R33: The referend components are passim: the popliteal lymphnode, the lymph, the serum. Detach*, Repl = conjunction of the components.
R34: Detach, Subst. The referential in the referend - this study is left unanalyzed.
R35: Repl = Subst in respect to a paraphrastic transformation which alters in 3.1 their measurement to measurement of them; the referend could be taken as inclusive of the reconstructed in the tissues (in 3.1)
R36: The in R36 is ambiguously anaphoric or determinative. If anaphoric, the referend-components can be given as (in 3.1): 1/2 (the antibody titers), 2/2 ((present) in the tissues).
Repl (under I) = 1/2 + wh (1/2) + are + 2/2
On primary site or source, Note to 193.1.10

204.3.2

R37: Detach, Subst. The referend includes the reconstructed phrase.
R38: RelDetach, Repl = a + (38)
R39: cf. R19 above for the referend. Detach, Subst. Neutralization in R39 is not further decomposed.

204.3.3

R40: The referend-components are either passim (cf. R33) or the occurrence in 3.3 of serum, lymph, lymphnode-extract. In the latter case, the tissues is epiphoric (Detach* for Epiphora; Repl = conjunction of the components).
R41: Detach, Subst. The proximate referend (R39) is indicated.
R42: I, Subst.
R43: I*, Repl = the (43). Virus in 3.2 and 3.3 might be considered anaphoric to inactivated influenzal virus in 1.1 In 3.3 the amount of virus might be considered anaphoric to in 3.2 the number of units of virus (against which... performed)

204.3.4

R44, R45, R49: I*, Repl = the (44). On virus, cf. note to R43
R46: so may be rewritten as and because of this (or: and for this reason) with deletion of that. The referend is the phrase preceding so in 3.3, Repl (under I) = Subst. with deletion of of
R47: The adjunct is not clearly part of the referential phrase, the referend is given in 3.2, Repl (under Detach) = 47 1/2 + wh (47 1/2) + 47 2/2.
R48: Detach, Subst. The referend - in 3.1 - is considered to include the reconstructed phrase.

204.4.1

R50: Detach*, Repl = Nom (50) = that (50). The classifier sentence: Tnat (50) is evidence (of specificity)can be appended as a secondary sentence on the adjusted referend, i.e., as which is evidence of specificity, permitting further transformation (via nominalization) to the evidence (of specificity) that (50). In R50 and R51, specificity is not regarded as introducing the zero-referentials the antibody, the antigen: the authors are concerned here with the fact of specificity considered in abstraction from particular antigens.
R51: Replacement of the epiphoric referential-classifier (R51) under Detach* for Epiphora is made by first adjusting 204.4.1 by depasivizing it and substituting for afforded a local synonym, e.g., provided; the referend is adjusted as: 51½ + wh (51 1/2 + 51 2/2 which can be paraphrastically transformed (by transposition of the modifier to before its host) to: clearly marked differences in titers...virus. The resultant is: The experiments in which opposite legs... provided clearly marked differences... . As in R50 - the classifier-sentence can be appended as a secondary sentence on the referend. On specificity, see note to R51.
R52: RelDetach, Subst.

204.4.2

R53-54: Reconstruction of the zero-referentials R53 and R54 can be presumably be avoided if the first conjunct of 204.4.2 is taken to be a consequence of various sentences within the section. Experiments Involving Different Serological Types of Virus (for related discussion, see chapter 5, section 5). R53 is referential to occurrences of antibody (passim) in this section (Detach, Subst); R54 to occurrences of lymphnode, perhaps being specified as to side of rabbit, i.e. left or right) - see R55-56. Detach*, Conjunction of these phrases. Alternatively, the zero-referentials may be analyzed as: [The antibody in [the tissues]
R55-56: Resolution of R55 and R56 can be formulated in several different ways. The simplest is to take the homologous and heterologous virus as referential to different serological types of influenzal virus (Detach, Subst). This resolution is less than perspicuous as it neglects the reference made to (site) side (or: tissue) by heterologous and homologous (see chapter 3, section 3.23). To indicate this reference requires rewriting opposite legs of each rabbit...virus in 204.4.1 to a leg on one side of each rabbit received an injection of one serological type of influenzal virus. R54 in 4.2 can be expanded to the tissue on a given side (cf. below). The referend of the homologous virus can be indicated as occurring in the rewritten 204.4.1 with an alteration of one side to a referential that side: (as adjusted) - the (one) serological type of

influenzal virus which a leg on that side received an injection of; that side in turn is referential to the reconstructed a given side. In similar fashion the adjusted referend of the heterologous virus (in 204.4.1, with a referential to a given side in 4.2) is: the serological type of influenzal virus which a leg on the opposite side to that side received an injection of. Yet another option is to avail oneself of the resolution of R54 as the lymphnode on the right side and the lymphnode on the left side and to rewrite 204.4.1 with arbitrary specification of opposite sides as the left side. This resolution, perhaps the most perspicuous, is the most involved as well inasmuch as the virus which is homologous/heterologous to the lymphnode on the left side is heterologous/hemologous to the lymphnode on the right. In all these cases, the rule of inference is Detach.

R57: cf. Note to R53

R58: The referend are occurrences of the serum (passim) in the section noted in the Notes to R53-54.

R59: The referend is clearly to the tacit referential announced by the phrase heterologous antibody, i.e., R60, thus corroborating the supposition of a tacit referential. I*, Subst.

R60-61: See Notes to R56 and R54.

In 4.2, the tissues (which closes the sentence) can be rewritten paraphrastically as tissues and hence is not considered referential.

204.4.3

R62: I, Subst.

R63: See Notes to R55; note the use of a given lymphnode in 4.3 (i.e., a lymphnode on a given side)

R64: Detach, Subst.

R65: cf. Note R53

R66: I, Repl = in + the (66)

R67: Detach, Subst.

R68: cf. R66

R69: Again and the later rise (R72 in 4.4) presumes a prior increase which is not mentioned in this section. Again can be rewritten as: as with/in the previous case. The referential the previous case can be taken to have as its referend a sentence which can be obtained from Fig. 2: the antibody-titers of the extract of a given lymphnode to the homologous-virus increased from the 2nd to 4th day after injection. Repl (under Detach) = pluperfect form of the referend (with deletion of the preceding preposition), i.e., the antibody-titers...had increased from...injection. Adjustment to the pluperfect form is evidentally related to the prior occurrence in time of the event related in the sentence given; again is a tense-related referential, cf. Note to R55 in the subsection Sequence of Events...

R70: I, Subst.

204.4.4

R71: I, Subst.
R72: The referend of R72 is taken to include a reconstructed (zeroed) subject of increase in 4.3: only for the mean titers of the antibody to increase... Inclusion of again in the referend accounts for the presumption of a prior increase (rise), cf. R69; the referend is also inclusive of the reconstructed complement of increase - R68. Under Detach. Repl = Nom-ing (72) = the mean titers of the antibody increasing there...thereafter.
R73: The in R73 is epiphoric to (i.e., determinative) the reflexive form referential the node. The result of a double-replacement (chapter 1, section 5.2) yields a form identical to R73. The phrase as a whole is taken as referential to the referend indicated in 4.3 above. Detach, Repl = the + (73), cf. R73 of the Introduction.
R74: Detach, Subst. The referend is itself a referential phrase, R58.

204.4.5

R75: The referend is the occurrence of the foot-pads in 198.2.2 (see below on the determination of the referend). Detach*, Subst.
R76: The referend is given as an occurrence of the lymph and the lymphnode (passim) in 198.2. Detach*, Repl = Conj. (the lymph, the lymphnode), cf. 198.2.13
R77: The referend can be given as an occurrence of the serum in 198.2 (passim), Detach, Subst., cf. 198.2.13
R78: The referend is given as an occurrence of the lymph-node (passim) in 198.2 (cf. R76 above). Detach, Subst.
R79: Under Detach* for Epiphora, Repl = Conj (79 1/2, 79 2/2) with a change in 4.5 of the preceding for to as. The referend-components of the epiphoric referential classifier are determinable given the zero-referentials (R80, 84) introduced by first, second. (see chapter 5, section 4) on the pattern of epiphora involved. Sentence 204.4.5 is evidentally related to 198.2.13 of the Sequence of Events... section which assists in the determination of a number of the referends noted (see chapter 5, section 5 for related discussion). A zero-referential, e.g. in the tissue is not reconstructed after production inasmuch as no site of production is asserted, cf. the negation is not a necessary condition for. Early days of antibody-production can presumably be related to early days after the injection, though only by way of tacit sentences; e.g., antibodies are present in the tissue early after the injection, antibodies are produced somewhere before being present in the tissue, etc.

204.4.6

R80: First in 4.6 is taken as an ordinal introducer of a plural referential (R80): the reconstruction of first to the first of them is: is provisional. Repl (under Detach) = the (80 1/3) + 80 2/3 + wh (80 1/3) + 80 3/3 (for which can be rewritten why)
R81: I, Repl = Poss (the (81))
R82: RelDetach, Subst
R83: I, Repl = the (81)
In 204.4.6 a general sentence of mnoothetic character, there are a number of phrases which are classifiers of preceding phrases, though not referential to these phrases: a substance classifies antibody, a site of production is a 'variable'-like classifier for various tissue-phrases, a reservoir classifies serum. Time may be taken as a classifier of day after an injection: note that - inasmuch as 4.6 is a general sentence - after the injection cannot be taken as announced by at a given time

204.4.7

R84: cf. R80
R85: R85 can be taken as an abbreviation of the less than comfortable: the popliteal one with one referential to the preceding occurrence of lymphnode; alternatively, R85 does not contain a referential phrase but lymphnode (the head of the phrase) is reconstructed as the inverse of a special repetitional zeroing (GEMP: 225-26)
R86: I, Repl = the (86 1/2) + wh (86 1/2) is + (86 2/2)
R87: Resolution of R87 presumes prior resolution of R85 via one or reconstruction of lymphnode as the inverse of a zeroing (cf. R85 above)
For reasons similar to those presented in the Note to 4.6 regarding time (and after an injection), a zero-referential into the animal is not taken as introduced by injected in 4.7.

204.4.8

R88: The referend-components are those given for R79 Detach*, Repl = Conj (88 1/2, 88 2/2) with an adjustment of under to as or inasmuch as. Circumstance is only loosely a classified of the referend-components,; the (nearly) synonymous condition would be more appropriate.
R89: The referend is given as the first conjunct of 198.2.2 Detach, Subst.
R90: cf. R76
R91: cf. R75
R92: cf. R77
In 204.4.8 the finding of antibodies...the serum could be taken as referential to 4.5 the demonstration of...antibody-production if early days of antibody-production (in 4.5) can be established as related to earlier after the injection (in 4.8). See Note to 204.4.5

204.4.9

R93: I, Subst.
R94: So along with that can be rewritten: and because of this (in accord with this) with this referential to the phrase indicated in 4.9, I, Subst.
R95: Detach, Subst.
R96: Resolution of R96 requires an implicit sentence: A popliteal lymphnode is located in each leg of a rabbit; from this and both legs were injected with the same antigen one can conclude that: a popliteal lymphnode is located on one leg injected with an antigen and a popliteal lymphnode is located on the other leg injected with an antigen.
Replacement under Detach* yields the popliteal lymphnode which is located on the one leg injected with an antigen and the popliteal lymphnode located on the other leg injected with that antigen (adjustments include formation of secondary sentences and Conj). In 4.9, both legs and the same antigen could be taken as referentials - the former via 198.2.2 and an implicit sentence: Foot-pads are parts of legs. (and Rabbits have two legs), the latter to 198.2.1 an inactivated preparation of the PR8 strain of influenzal virus (Detach*, Repl = the + referend)
In 4.9 both legs can be regarded as referential to a phrase in a consequence of an implicit sentence, e.g., Rabbits have two legs and 198.2.2 of the Sequence of Events section (this section is where Fig 1 is first noted); the same antigen is referential to an inactivated preparation...virus in 198.2.1

204.4.10

R97: Detach, Subst.
R98: Detach, Subst. Considerations presented below (R99) permits one to relate (of) this experiment to (after) the injection
R99: The referend is indicated in 4.8 above. Detach. Nom-ing (99) = antibodies being found earlier...serum. This referend corroborates the referend given for R91 in 4.8, the local lymphatic system (cf. lymphnode and lymphnode-extract in 4.10), and permits us to relate the early days of this experiment in 4.10 to earlier after the injection in 4.8 (compare, e.g., R55 in 193.3.4 (Introduction), R73 in 198.2.15 (Sequence of Events)). Both R99 and its referend in 4.8 are connected to 198.2.13 - see chapter 5, section 5 for some discussion.
R100: Then, following GEMP: 71, can be rewritten as in these conditions with these conditions ambiguously referential to: a) both legs...same antigen, b) that the serum...supply c) both legs...supply, in 4.9 ((c) is adopted as the referend here). The classifier-sentence + That both legs were injected...supply are conditions can be nominalized as the conditions that (in which) both legs...supply. The nominalized classifier-sentence replaces these conditions under Detach*.

R101: lymphatic in R101 can be taken as an announcer of: in the lymphatic tissue with the lymphatic tissue referential to an occurrence of the lymphnode (passim) in the Sequence of Events... section cf. R99
R102: The referend is the discontiguous phrase in 4.10 - the antibody in lymph and lymphnode-extract conjoined with the reconstructed the antibody in the serum. I, Conj.
In 204.4.10 greater can - not without some awkwardness - be taken to introduce a zero-refrential: a significance as to the lymphatic source of the antibodies found greater than [the significance above as to the lymphatic source of the antibodies found]. The referend in 204.4.8 is the finding of antibodies...under these circumstances (permuting the PN phrase) is particularly significant. Under Detach, Replacement consists in nominalizing the referend as: the particular significance of the finding.... (R88 may be assumed as replaced)

205.1.1

R103: The referend can be given as the reconstructed the lymphatic tissue (cf. R101) or as the referend of that referential phrase.
R104: On the and the emphatic reflexive-form itself, cf. R73. The entire phrase is not itself referential - the lymphocyte itself can be rewritten lymphocytes.
R105: The referend is either passim or R102 above. Detach, Subst. See Note to 193.1.10 on primary source.
R106: The referential-phrase is rewritten: that which is evidence for antibody (cf. chapter 1, section 8.3). That is epiphoric to 205.1.2, 205.1.3, 205.1.4, and in 205.1.5: that this ratio is greatest...system. The first 3 components are nominalized as that (S) and conjoined under and. The rule of inference is Detach* for Epiphora (the adjusted referends - conjoined under and - are together classified by evidence for the lymphocyte...antibody. The resulting form is more acceptable if a classifier for the components (a resumptive proform), e.g., facts follows which (with a concomitant change of is to agree with facts), i.e., which facts are evidence for...antibody
(See chapter 5, sections 4 and 6)

205.1.2

R107, 109: cf. R105
R108: I*, Repl = 108 1/2 + wh (108 1/2) + 108 2/2
R110: I, Subst.
R111: RelDetach, Subst.
R112: I, Repl = the (112)
R113: RelDetach, Subst.
R114: I, Subst.

205.1.3

R115: I, Repl = the (115)
R116: I, Repl = the (116 1/2) + wh (116 1/2) + (116 2/2)
R117: cf. R105
R118: Replacement of R118 requires that to a degree/extent be reconstructed as an appropriate modifier on the comparative-form lower in 1.3 (see GEMP Section 9.11 on the comparative). The referend can be indicated as: (the true volume of lymphocytes is lower)$_{3/4}$ (to)$_{2/4}$ (an extent)$_{1/4}$ (than the packed-cell volume)$_{4/4}$ and replacement (under I) = the (1/4) + 2/4) + wh (1/4) + 3/4 + 4/4

205.1.4

R119: Detach; Repl = Nom-ing of both conjuncts of the referend
R120: The in R120 can be considered determinative or anaphoric. If anaphoric, the referend-components are obtainable from Table 1, e.g., The antibody- titer of the lymphocyte-extract of rabbit no 34 is 4096. These components are nominalized as That S and conjoined. Replacement of the adjusted compo;nents (under Detach*) requires that however he permuted to sentence-initial position and that even be deleted.
See chapter 3, section 2 for discussion of Table 1.
R121: The referened occurs passim in sentences obtained from Table 1. Detach, Subst.
R122: I*, Repl = the (122). The same specimens could also be taken - given the decomposition of Table 1 noted in R120 - as referential to phrases numbering particular rabbits, e.g., rabbit no. 40.

205.1.5

R123: I, Subst.
R124: To indicate the referend - in 1.4 - requires a passival transformation of the sentence - The values recorded show a ratio...specimens to A ratio of as much as 16 is shown by the values recorded to the titer of lymph-plasma of the same specimens. In the transformed sentence - the first component is a ratio of, the second - 16, and the third - is shown by...specimens. Repl (under Detach) = the 1/3 + 2/3 + wh (1/3 + 2/3) + 3/3.
R125: The referend-components: the lymphnode, the lymph-plasma, the lymphocyte-extract occur passim in sentences obtainable from Table 1 and those of prior sections. Repl (under Detach*) = Conj. of the components. The lymphatic system classifies these phrases as conjoined, and not each considered separately.
R126: I, Subst.
R127: I, Subst.
R128: I, Repl = Poss (the (128))
R129: I, Subst.

R130: cf. R128.
In 205.1.5, additional in It is considered (to be) of additional significance can be taken as introducing a zero-referential, i.e., It is considered to be of a significance additional to the significance of the fact above. The fact above is referential-classifier of the values-recorded show a ratio...specimens in 1.4. A nominalization of the classifier-sentence - That the values recorded....is a fact to The fact that the values recorded show... can replaced the referential (under Detach*). Primary source is synonymous with site of production (see comments in 193.1.10 above); secondary size is where antibodies are found second. From 204.1.4-5 it may be concluded that its primary source is the lymphocytes, and its secondary site is the lymph-plasma; these phrases (its primary source, its secondary site) are, however, not referential to the lymphocytes, the lymph-plasma respectively.

205.1.6

R131: The referend can be taken as - in this study, see 204.2.1. Detach, Subst.
R132: Detach, Repl = the (132). The referend is indicated in 205.1.2.
R133: Detach, Subst. (see 205.1.2)
R134: I*, Subst.
R135: Detach, Subst. (see 205.1.4)
R136: I, Subst.

SUMMARY

205.2.1

R1: I*, Subst.
R2: I*, Subst. The popliteal lymphnode could be regarded as itself referential with its referend passim in the Sequence of Events... section.
R3: RelDetach, Subst.
R4: I*, Subst. The referend phrase may be taken to include of the rabbit.
R5: I, Subst.
In 205.2.1 the injection of...rabbit could be regarded as referential to the first clause of 198.2.2 (see the discussion in chapter 5 section 4); the rabbit is not considered referential - change of the article to a yields a paraphrase of the sentence. The phrases lymph obtained... node and the efferent...node could also be regarded as anaphoric referentials.

205.2.2

R6: Detach, Repl = the 6 1/2 + wh (6 1/2) + 6 2/2
R7: Detach, Subst.
R8: Detach, Subst. (cf. R4)
R9: The referend occurs in the section Sequence of Events ... (198.2.13-14) - the lymphnodes and lymph (cf. chapter 5, sections comparing such sentences as 205.2.2 and 198.2.13, 205.2.3 and 198.2.14-15). Detach*, Subst.
R10: The referend is passim in the section noted above. Detach, Subst.
R11: Detach, Subst.

205.2.3

R12: Detach, Subst.
R13: The referend could be taken as antibodies-passim in the preceding 2 sentences of the summary section. Detach, Subst.
R14: Detach, Subst. The proximate referend is indicated.
R15: I, Subst. The referend is taken to include the reconstructed referential. On the decomposition of serum-titer, see chapter 3, section 3.1
R16: The referend can be given as R9 or to the referend of R9 indicated in the note. Detach*, Subst.

206.1.1

R17: Detach, Subst. On determination of the referend, see 204.1.3. Note to R11 of the Discussion
R18: Detach*, Subst.
R19-20: The similarity of this sentence to 204.1.1 and the note to that sentence above suggests a parallel analysis of R19-20 here. Here in place of the local lymphatic system,

however, the local lymphatic tissue occurs - as prior occurrences of the lymphatic tissue refer to occurrences of the lymphnode, the occurrence of the lymphnode in 1.2 is given as the referend (the occurrence of lymphocytes in 1.4 may be taken to comprise a second component by way of an implicit sentence, e.g., Lymphnodes contain lymphocytes). Detach* for Epiphora, Subst. The referend of R20 might accordingly be restricted to marked enlargement of the lymphnode,...tissue. If 206.1.4 is included as a second component, Repl (under Detach* for Epiphora) = Conj (20½, Nom_S (20 2/2) with the altered to a). The adjusted second component is a sharp rise of the absolute and relative count of lymphocytes...lymphnode.

206.1.2

R21: Detach, Subst.

206.1.3

R22: Detach, Repl = the + (22)
R23: RelDetach, Subst.

206.1.4

R24: Detach, Subst.

206.2.1

R25: RelDetach, Subst.
R26: The is determinative or anaphoric. If anaphoric, the referend is passim in the section Experiments Involving Different Serological Types...
R27: I*, Subst.
In 206.2.1, results which corroborate....produced may be considered referential to specific text-sentences in the section mentioned above (R26); chapter 5, section 5 provides some related discussion

206.3.1

R28: Detach, Subst.
R29: each is taken to introduce a 'set' zero-referential (see GEMP:136,328). Taking the set as the referential-phrase - the 'classifier-like' sentence - cells and plasma form a set can be nominalized as: the set of cells and plasma. (I)
R30: I, Conj (30 1/2, 30 2/2). More accurately - each component of R30 should be replaced separately and the resultants conjoined: and testing cells for antibody-content and testing plasma for antibody-content,...
R31: I, Subst with change of found to a local synonym, e.g., discovered (see discussion of R84.5 in Methods and Materials section)

206.3.1

R32,34: The second and third components of the referends for R32 and R34 are the same: (2/3) into; (3/3) separation of lymph from the popliteal lymphnode. The first component of R32 and R34 is cells and plasma respectively. Under I, Repl = the 1/3 + 2/3 + wh (1/3) + DeNom (3/3) (= lymph from the popliteal lymphnode was separated)
R33: I, Subst.

206.3.2
R35: Detach, Repl = the (35 1/4) of (35 2/4) + (35 3/4) + wh (35 1/4) + (35 4/4)
R36: RelDetach; the in (36) is altered to a
R37: Detach*, Subst.
R38: See Note to R125 in the Discussion section.

206.4.1

R39: The referend-components of the referential classifier R39 (each component is classified by is a finding) are the preceding sublanguage sentences, i.e., 205.2.1, 205.2.2, 205.2.3, 206.1.1-3, 206.2.1, and in 206.3.1 that the titer of antibody...16:1, 206.3.2. Replacement (under Detach*) involves a number of adjustments: 205.2.1 is nominalized as that (205.2.1); in 2.2 these antibodies is zeroable, 205.2.3 is nominalized as that (S). In 206.1.1 - there is a general burst...tissue is zeroable inasmuch as its referend is contained in succeeding sentences: that precedes at the same time + 206.1.2. In 206.1.3 this is replaceable by which - the secondary can be attached to the nominalized 206.1.2; 206.1.3 and 206.2.1 are nominalized as that (S). In 206.3.1, R32 and R34 can be taken as replaced; 206.3.2 is nominalized as that (206.3.2). The resultant forms are then conjoined under and or comma.
In 4.1 the lymphocytes is replaceable (paraphrastically) by lymphocytes and is not considered referential. The interpretation of that the lymphocytes...protein as a general sentence is corroborated by R40.

206.4.2

R40: Detach*, Subst.
R41: RelDetach, Subst. The referend phrase earlier studies is not expanded to studies earlier than this study.
R42: Given a transformation of 4.2 to This conclusion...in which researchers demonstrated that the lymphocyte has a similar role in the formation...antigens, the referend indicated in 4.1 can be substituted with deletion of have. Similar "the same".
In 4.2, the lymphocyte is not considered referential - see note to 4.1 above.

Acknowledgement

206.5.1

R1: R1 refers to the names of the authors in the title. Detach, Subst. See chapter 3, section 1 on what comprises the text. In 5.1, lymph-specimens could be rewritten specimens of the lymph, with the referend of the lymph occurring passim. The collection...specimens may be construed as referential to the second conjunct of 194.3.5.