

ON THE PROBLEMS EMBRACED IN "OPINION" 99
(RELATING TO THE NAMES "ENDAMOEBA" LEIDY, 1879,
AND "ENTAMOEBA" CASAGRANDE & BARBAGALLO,
1895) RENDERED BY THE INTERNATIONAL COMMISSION
ON ZOOLOGICAL NOMENCLATURE

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(Commission's reference Z.N.(S.)185)

I. Introduction.

Recently Professor Harold Kirby (1945) has written an able critique of the decisions embodied in *Opinion* 99 rendered by the International Commission on Zoological Nomenclature (1928). He has concluded that, contrary to certain of these decisions (1) *Entamoeba* Casagrandi and Barbagallo, 1895, cannot be regarded as a homonym of *Endamoeba* Leidy, 1879; and (2) the species with the trivial name *blattae* of Bütschli (1878) should not, despite the conclusions embodied in *Opinion* 99, be regarded as the type species of both genera, but only of *Endamoeba* Leidy, 1879.

2. I endorse Kirby's thesis wholeheartedly, but I should like to restate the problem in order to emphasize what I consider to be certain fallacies in *Opinion* 99, which are not altogether covered by Kirby, and to make certain further proposals. *Opinion* 99 is a remarkable collection of contradictions and apparent misinterpretations of the *Règles* and certain preceding *Opinions*, as I am prepared to show here.

3. Originally a draft of the present paper was submitted to Mr. Francis Hemming, Secretary of the International Commission, in 1946. Subsequently the author visited Mr. Hemming in August, 1948, and it was agreed between them that, in view of the extensive changes that the Thirteenth International Congress of Zoology, acting on the advice of the International Commission, brought about in the *Règles Internationales de la Nomenclature Zoologique* at the Paris Meetings of July, 1948, the paper should be examined in the light of any pertinent new decisions, revised, and submitted again. I have delayed doing this in anticipation of the publication of the "Official Records of Proceedings of the International Commission on Zoological Nomenclature at their Session, held in Paris in July, 1948." Now that this has been done in Volume 4 of *The Bulletin of Zoological Nomenclature*, I have been able to redraft the present paper and am resubmitting it herewith.

4. One of the decisions taken by the International Commission at Paris was that *Opinion* 99 was to be considered *sub judice* and that specialists were to be invited "to communicate to the Commission their views on the action to be taken by way of confirming, modifying or reversing the decisions recorded in [the *Opinion*]" (see 1950, *Bull. zool. Nomencl.* 4: 337-338). This was done

on the basis of the recognition by the Secretary to the International Commission that *Opinion* 99 was "very poor" and should be reconsidered (see 1950, *Bull. zool. Nomencl.* **3**:128). It is, therefore, particularly appropriate that the present paper be tendered for publication.

5. Moreover, it will be evident from the ensuing sections of this paper that it is of vital importance to the stability of the names of certain genera and species of amoebae parasitic in Man and other animals, that the International Commission not only revise *Opinion* 99, but consider such additional problems not originally raised therein as must be solved in order to give permanency to the names of these parasites. This will require the exercise of the plenary powers to secure certain names and the placing of these and other names in the "Official List of Generic Names in Zoology," and the "Official List of Specific Trivial Names in Zoology," as provided for at Paris (see 1950, *Bull. zool. Nomencl.* **4**:267-271, 333-335).

6. To aid both in the revision of *Opinion* 99 and in the realization of stability for the names applied to important enteric amoebae, the present paper is organized into several sections: (I) the present introduction; (II) the historical background of *Opinion* 99; (III) and (IV) analyses of the summary and body, respectively, of *Opinion* 99; (V) the status of the trivial names *coli* of Grassi (1879) and *histolytica* of Schaudinn (1903) as applied to certain amoebae of Man; and (VI) the status of the generic names *Endamoeba* Leidy, 1879, *Entamoeba* Casagrandi and Barbagallo, 1895, and certain others applied to enteric amoebae. Finally, in section (VII) are summarized the conclusions drawn from the studies of the preceding sections.

II. Historical Background of "Opinion" 99.

7. *Opinion* 99 is entitled "*Endamoeba* Leidy, 1879, vs. *Entamoeba* Casagrandi and Barbagallo, 1895." Its summary reads as follows: "*Entamoeba* 1895, with *blattae* as type by subsequent (1912) designation, is absolute synonym of *Endamoeba* Leidy, 1879a, p. 300, type *blattae*, and invalidates *Entamoeba* 1895, type by subsequent (1913) designation *hominis=coli*."

8. To recapitulate briefly, the following are the principal historical facts* of the case treated by *Opinion* 99, many of which were not, however, considered in the *Opinion*:

- (i) Lösch (1875) described in detail the clinical picture and lesions resulting from an amoebic infection in the large bowel of a young Russian and also provided a description (pp. 203-207) and figures (Pl. x, figs. 1-3), of the causative organism from which it is quite evident that he was dealing with the species now generally called *Entamoeba*, or *Endamoeba*, *histolytica*. To this form he gave the

* For a more detailed history the excellent monograph by Dobell (1919) should be consulted—also the less lucid, although more exhaustive, survey of Stiles and Boeck (1923).

name *Amoeba coli* (: 208).

- (ii) Bütschli (1878 : 273–277) described a new species, *Amoeba blattae*, from the gut of the oriental roach, *Blatta orientalis* Linnaeus, 1758—an insect still known by that name.
- (iii) Grassi (1879) described amoebae from human faeces and identified them (p. 445) as representing the same species as observed by Lösch (1875). However, in the opinion of Dobell (1919) Grassi dealt primarily with the species now generally known as *Entamoeba*, or *Entamoeba coli*, although some individuals, at least, of *E. histolytica* were apparently also seen.
- (iv) Leidy (1879 : 300) formed the new genus *Entamoeba* for the single species, hence type species (by monotypy : Article 30(c) of the current *Règles*†) *Amoeba blattae* Bütschli, 1878.
- (v) Casagrandi and Barbagallo (1895 : 18) in a study of an intestinal amoeba of Man, which they called "*Amoeba coli* Lösch," erected a new genus *Entamoeba* in apparent ignorance of the existence of the name of *Entamoeba*** Leidy, 1879. In it they placed "*Amoeba coli* (Lösch)" and "*Amoeba blattarum* (Bütschli)" [*Amoeba blattae* Bütschli, 1878]. No type species was designated. It is evident from their paper that these authors were dealing not with Lösch's *Amoeba coli*, but with Grassi's—the species today known generally as *E. coli*. They did not themselves form the combination *Entamoeba coli*, although it is credited to them by Dobell (1919); actually this was later done by Schaudinn (1903). In a subsequent paper they (Casagrandi and Barbagallo, 1897 : 103) renamed this species *Entamoeba hominis*.
- (vi) Schaudinn (1903) was responsible for fixing the usage of the trivial names now almost universally employed for the two species of amoebae in humans, originally designated *Amoeba coli* by Lösch (1875) and *Amoeba coli* by Grassi (1879)—what may aptly be termed the dysenteric and large nondysenteric amoebae of Man, respectively. As Dobell (1919) has pointed out, by far the happiest solution would have been for Schaudinn to accept Lösch's name for the dysenteric species, as would have been correct, and, in view

† The most recent presumably official edition of the *Règles* appeared in 1929 in the publication of the X [1927] International Congress of Zoology at Budapest (Int. Comm. Zool. Nomencl. 1929). A new official edition is now in preparation based on extensive changes adopted by the XIII International Congress of Zoology at its Paris Meeting in 1948, acting on the advice of the International Commission on Zoological Nomenclature.

** In base a tutti questi dati, anzi, riteniamo necessario tornare sulla classifica delle Amebe, stabilendone un nuovo genere, che proponiamo di chiamare *Entamoeba* e vi collochiamo subito l'*Amoeba coli* (Lösch), e l'*Amoeba blattarum* (Bütschli).

of the fact that Grassi's name was a homonym of Lösch's, to take the next available name, *Entamoeba hominis* Casagrandi and Barbagallo, 1897, for the nondysenteric species. His observations on morphology as well as nomenclature were on several counts erroneous and have been severely and justifiably criticized by Dobell. His nomenclatorial conclusions were that the non-dysenteric species should be called "*Entamoeba coli* Lösch emend. Schaudinn" (:564) and that the dysenteric species should be given a new name, for which he proposed "*Entamoeba histolytica*" (:564, 570). In so doing, he accepted the genus *Entamoeba* Casagrandi and Barbagallo, 1895, for both species. Schaudinn's prestige was such that his determinations became entrenched in the literature, and to-day the trivial names, at least, dominate all fields concerned with amoebae in Man.

(vii) Lühe (1909 : 421) erected the new genus *Poneramoeba* for the single species, *Entamoeba histolytica* Schaudinn, 1903, from Man; this he specifically designated as the type species of his new genus. It was the next new genus after *Entamoeba* Casagrandi and Barbagallo, 1895, erected or used for amoebae in the vertebrate digestive tract.

(viii) Chatton (1910 : 282-284) placed in a genus "*Entamoeba* Leidy (1879)" seven supposed species. "*Entamoeba coli* (Lösch) 1875" [= *Amoeba coli* Grassi, 1879], "*E. blattae* (Bütschli) 1878"; "*E. ranarum* (Grassi) 1881"; "*E. muris* (Grassi) 1881"; "*E. buccalis* Prowazek, 1904; *E. histolytica* Schaudin, 1903; and "*E. tetragena* Viereck 1906=*E. africana* Hartmann 1908" [= *E. histolytica*]. The only mention of Casagrandi and Barbagallo's work appearing in Chatton's paper was in a footnote to the effect that "*Entamoeba*" had been incorrectly assigned by Doflein (1909) to the authorship of the Italian workers.* Chatton did not cite any species as the type species of his "*Entamoeba*," nor did he mention the spelling "*Endamoeba*" used by Leidy.

(ix) Chatton and Lalung-Bonnaire (1912 : 142) removed the amoebae of the digestive tract of vertebrates from the genus "*Entamoeba* Leidy" into a new genus *Löschia*, stating that only the species, originally called *Amoeba blattae* by Bütschli (1878) should remain in Leidy's genus. To *Löschia* they transferred the following four species from *Entamoeba* : "*E. coli* Lösch" [= Grassi], "*E. tetragena* Viereck" [= *histolytica* Schaudinn], "*E. ranarum* Grassi," and "*E. muris* Grassi," and for the forms with a *tetragena*-[=*histolytica*-] like nuclear picture they raised a new subgenus *Viereckia* "*E. coli* Lösch" was designated as the type species of the nomino-

* C'est à tort que Doflein (1910 [=1909]) attribue la paternité du genre *Entamoeba* à Casagrandi et Barbagallo (1897 [sic]).

typical subgenus, hence of the genus, *Löschia*.* They incorrectly claimed that Casagrandi and Barbagallo (1897) had applied Leidy's genus to the amoebae of the vertebrate digestive tract.†

- (x) Chatton (1912 : 111) republished the conclusions already expressed in his paper with Lalung-Bonnaire, but mentioned only "*Löschia coli*" and "*Viereckia tetragena*" in the genus *Löschia*. For the first time he mentioned—in a footnote—the spelling *Endamoeba*,** but dismissed it as an orthographic variant.
- (xi) Brumpt (1913 : 25) referred the amoebae of Man to the genus "*Entamoeba* Leidy, 1879." He also stated—in a footnote—that the same genus had been created in "1897" by Casagrandi and Barbagallo for†† "*E. coli*."
- (xii) Crawley (1913 : 185) listed "*Entamoeba histolytica* Schaudinn, 1903" as the type species of the genus *Entamoeba*.
- (xiii) Dobell (1919 : 17–19) in a scholarly review of the nomenclature of the amoebae in Man accepted as valid for amoebae of the vertebrate digestive tract the genus *Entamoeba* Casagrandi and Barbagallo, 1895 (*non Endamoeba* Leidy, 1879), formally (: 18) selected as its type species "*E. coli*," and included as congeneric with *E. coli* the species *E. histolytica*, among others. He confined the genus *Endamoeba* Leidy, 1879, to *Amoeba blattae* Bütschli, 1878. In later parts of his paper he reviewed in detail the nomenclatorial history of the species to-day generally known by the trivial names *coli* and *histolytica*.
- (xiv) Stiles and Boeck (1923 : 121–150) exhaustively discussed the nomenclature of the dysenteric and nondysenteric amoebae of Man and dismissed (: 124) *Entamoeba* Casagrandi and Barbagallo, 1895, as a homonym‡ of *Endamoeba* Leidy, 1879. Nevertheless they regarded Brumpt (1913) as having fixed the type species of the former as *Entamoeba hominis* [= *Amoeba coli* Grassi, 1879], and they also recognized a separate nominal genus *Entamoeba* Chatton,

* On pourra même distinguer subgénériquement les Entamibes à 4 noyaux (type *tetragena*), des Entamibes à 8 noyaux (type *coli*), sous le nom de *Viereckia n. subgen.*

† C'est Leidy qui a créé le genre *Entamoeba* pour l'amibe de la Blatte, et ce n'est qu'en 1897 que Casagrandi et Barbagallo l'ont appliquée aux amibes intestinales des Vertébrés.

** Avec la variante orthographique *Endamoeba* qui ne peut en aucune façon constituer un prétexte à conserver les deux noms simultanément.

†† Ce même genre a été créé de nouveau en 1897 par Casagrandi et Barbagallo pour leur *E. hominis*, synonyme de *E. coli*.

‡ [*Entamoeba* 1895 is not available because of *Endamoeba* 1879.]

1912 (overlooking Chatton's 1910 paper and not recognizing the priority of Chatton and Lalung-Bonnaire's paper) as an emendation of *Endamoeba* Leidy, 1879, consequently with the same type species, *Amoeba blattae* Bütschli, 1878. They provisionally regarded *Amoeba blattae* Bütschli, 1878 (type species of *Endamoeba* Leidy, 1879—by monotypy), and *Entamoeba hominis* Casagrandi and Barbagallo, 1897 [= *Amoeba coli* Grassi, 1879] as congeneric. The foregoing conclusions were essentially followed by Stiles and Hassall (1925), except that they listed *Entamoeba* Casagrandi and Barbagallo, 1895, as a synonym rather than a homonym of *Endamoeba* Leidy, 1879.

- (xv) The International Commission on Zoological Nomenclature in *Opinion* 95 (1926) placed *Endamoeba* Leidy, 1879, with type species *Amoeba blattae* Bütschli, 1879 (by monotypy) on the "Official List of Generic Names in Zoology." Later the International Commission (1928) reviewed some of the facts given here under paragraphs (i) to (xiv), and published *Opinion* 99. After much indecisive discussion it was finally concluded in the summary of the latter *Opinion*, that Chatton (1912) had selected a type species for "*Entamoeba* 1895," when he transferred *Entamoeba coli* and other species in vertebrates to the genus *Löschia* and thus left only *Entamoeba blattae* in the genus *Entamoeba*. This conclusion was presumably based on *Opinion* 6, which was invoked in the body of the *Opinion*. Obviously, it was not questioned whether Chatton actually was dealing with *Entamoeba* Casagrandi and Barbagallo, 1895, when he supposedly fixed its type species.

9. I proposed herein to analyze in detail in Sections III and IV, on the summary and body of *Opinion* 99 respectively, the question of the selection of a type species for the genus *Entamoeba* Casagrandi and Barbagallo, 1895, and to show that from the historical facts it must be concluded that no one actually selected its type before Dobell (1919).

III. Analysis of the Summary of "Opinion" 99.

10. First of all it can be shown that the summary of the *Opinion* itself cannot be supported by the *Règles* and previous *Opinions*. The crux of this summary is based upon one point in the general conclusions of the body of the *Opinion*, and in the report by Commissioner K. Jordan, which appears at the end of the discussion on the *Opinion* and was unanimously adopted by the Commissioners present at the Tenth International Congress of Zoology in Budapest, 1927. In this summary, as one can read in the quotation thereof already given, appears the following phrase: "*Entamoeba* 1895, with *blattae* as type by subsequent designation (1912)." This is presumably based on the following statement in Jordan's report (: 8, under "A. Nomenclatorial Con-

siderations"): "In 1912 Chatton separated from *Entamoeba* the species *coli* as genotype of his new genus *Löschia*, leaving *blattae* as only species in *Entamoeba*. As nobody had dealt, nomenclatorially, with *Entamoeba* prior to 1912, Chatton's action made *blattae* the type of *Entamoeba*." Actually Chatton and Lalung-Bonnaire (1912) were the first to do this; Chatton (1912) merely reaffirmed their earlier action.

11. Now the foregoing quotation is an important statement as it suggests that a species may become the "type by elimination." Yet in the present *Règles* (Article 30(k)) the designation of "type by elimination" is only one of a number of non-mandatory *Recommandations*. It is true that under one limited condition the *Opinions* have established that elimination may fix a type species. Thus in *Opinion* 6* (Int. Comm. Zool. Nomencl., 1910, 1944b), the summary reads (in its most recent form—1944b): "When, in the case of a generic name published not later than 31st December, 1930, a later author divided the genus 'A——', species 'A—— b——' and 'A—— c——', leaving genus 'A——', only species 'A—— b——', and genus 'C——', monotypic with species 'C—— c——', the second author is to be construed as having fixed the type of the genus 'A——'." But, as pointed out by Mr. Francis Hemming, Secretary to the Commission, in his editorial notes on the new edition of *Opinion* 6 (1944b: 134–135), the above summary is explicit in limiting its jurisdiction to the case where the original genus "A——" has two species and two species only, and the second genus "C——" is monotypic.†

12. Let us suppose then, for the sake of argument, that Chatton and Lalung-Bonnaire (1912) comprehended *Entamoeba* Casagrandi and Barbagallo, 1895, when they transferred species from "*Entamoeba*" to *Löschia*. In this light one finds that *Entamoeba* Casagrandi and Barbagallo, 1895, qualifies as genus "A——" in the sense of *Opinion* 6—with two species "*Amoeba coli*" and "*Amoeba blattarum*." However, Chatton and Lalung-Bonnaire's genus

* Now cancelled, except for historical purposes, and its decision incorporated into the *Règles* (see 1950, *Bull. zool. Nomencl.*, 4: 157, 165–166).

† Prior to the Congress of 1948, not all workers agreed with Mr. Hemming that *Opinion* 6 need be so narrowly interpreted. Thus Sabrosky (1947) analyzed the body of the *Opinion* and pointed out that in paragraph 2 the statement was made that "cases which were as clear as the one given in the diagram [i.e., the scheme presented in the summary] should be construed under Article 30(g), namely, that the type of the original genus was fixed when, through a division of its species, it was definitely made into a monotypic genus." It was Sabrosky's contention on the basis of this statement that a genus "A——" need not have two species in order to come under the jurisdiction of *Opinion* 6, so long as all but one species have been removed by some subsequent worker, thus leaving "A——" monotypic. Sabrosky's interpretation is a reasonable one. However, the summary of *Opinion* 6, as it stands, conveys no such flexibility of interpretation and must, it seems to me, be the principal arbiter of the point. Moreover, the International Commission at Paris recommended in its report, which was accepted by the Thirteenth International Congress, *inter alia*, the insertion in Article 30, Rule (g), of words to convey the substance of the summary of *Opinion* 6, i.e., only the limited interpretation thereof (see 1950, *Bull. zool. Nomencl.* 4: 157); moreover, *Opinion* 6 has now been cancelled for interpretative purposes (see Footnote 10).

"C—" in the sense of *Opinion* 6 would be *Löschia*, which emphatically was not monotypic. The vital point here is that it was formed for four species in two subgenera: *Löschia* and *Viereckia*.

13. It may be claimed that, in effect, *Opinion* 99 established a new precedent and extended the application of selection of "type by elimination" beyond *Opinion* 6. But it does not appear that such was the intention of Commissioner Jordan or of Secretary Stiles. Actually they were merely invoking *Opinion* 6 as the following quotations from the body of the discussion on the *Opinion* indicates: (p. 6, ¶ 3) "... accordingly, for Chatton *Endamoeba* 1879 and *Entamoeba* 1897 were simple orthographic variants and it is not at all impossible (renaming and cf. *Opinion* 6)" [*italics mine*—E. C. D.] "to construe his papers (1910, 282, and 1912, 110) as a designation of *blattae* as type of *Entamoeba* Casagrandi and Barbagallo, 1897"; (P. 7, ¶ 2 (d)) "since (under *Opinion* 6) Chatton's paper (1912, *Bull. Soc. zool. France*: 113) is to be interpreted as designating *blattae* as type of "*Entamoeba*" 1897 (=1895), [*emendation of Endamoeba*, but obviously construed as identical with *Entamoeba*]..." But *Opinion* 6, as it is now understood, does not apply here. It is clear that the Commission based the most vital part in the summary of *Opinion* 99 on an invocation of a previous ruling, which at the time was, at best, of questionable application and must now be regarded as erroneously applied (see footnote 11).

IV. Analysis of the Body of "Opinion" 99.

14. Since it has been demonstrated that the summary of *Opinion* 99 and in effect its conclusions are based on false premises, it would be well to examine the other points discussed in the body of *Opinion* 99 and to analyze the historical facts to determine why, as I consider, (1) no other and justifiable grounds exist for an equivalent decision—namely, that of the type *Entamoeba* Casagrandi and Barbagallo, 1895, was fixed as *Amoeba blattae* Bütschli, 1878; and (2) why a type selection was not made until Dobell's work (1919).

15. Dobell (1938) has published a critique of *Opinion* 99 in which he has pointed out certain fundamental inconsistencies in the presentation and body of the *Opinion*, but has not considered all of the basic nomenclatorial issues involved. Kirby (1945)¹ has aired most of the fallacies of the *Opinion*. My analysis is partly an extension of his, with additional observations on applications of certain provisions of the *Règles* and *Opinions*. Dobell's works (1919, 1938) have been indispensable for their complete accounts of the history and zoology of the enteric amoebae of Man.

16. There are three principal statements or assumptions in the body of *Opinion* 99 that deserve attention. These may be summarized as follows:—

- (i) The point, not brought out in the "Summary," but nevertheless

¹ See pp. 130 — 139 of the present volume, where Professor Kirby's paper is reprinted.

expressed by Secretary Stiles in several places in his discussion—that *Entamoeba* is a virtual homonym of *Endamoeba*. This was summarised by Commissioner K. Jordan under “Philological Considerations” (: 8) as follows: “In zoology the prefixes *Ento*— and *Endo*— are frequently interchanged. In zoological terminology they are located as being identical. They come under the category of names of which the spelling in Latin varied to a slight extent and which the Rules of Nomenclature do not accept as different, such as *auctumnalis* and *autumnalis* . . . *Entamoeba* is philologically the same as *Endamoeba*.” Despite this conclusion, the body of the discussion (: 5, ¶ 4) contains evidence that the prefixes *endo*— and *ento*— can be regarded as of different Greek origin (from *ἐνδον* and *ἐντός* respectively).

(ii) The point that Chatton’s emendation *Entamoeba* (1910) of Leidy’s *Endamoeba* (1875) automatically takes the same type, *Amoeba blattae* (: 6, ¶ 2). “*Endamoeba* Leidy, 1879a, p. 300, has for its monotype *Amoeba blattae*. The generic name was emended by Chatton, 1910, Ann. Zool. exp. gén., 282, and 1912, Bull. Soc. Zool. France, p. 110, to read *Entamoeba*, and by Chatton and Lalung, 1912, BSPE, p. 142, in the same sense. Accordingly, there is a generic name *Endamoeba* and one *Entamoeba* with the same species (*E. blattae*) as type.”

(iii) The point that Brumpt (1913) among others may be regarded as having selected the type species of *Entamoeba* Casagrandi and Barbagallo, 1895 (: 6, ¶ 2). “. . . The first type designation in words was by Brumpt (1913, p. 21) as *Entamoeba hominis* which is *Amoeba coli* renamed.”

17. Of these three points the first has been demonstrated to be incorrect by Dobell (1938) and Kirby (1945); the second is demonstrably true; and the third is equivocal. All three are taken up in order in the following three sub-sections ((a) to (c)).

(a) Orthographic independence of *Endamoeba* and *Entamoeba*.

18. As Dobell (1938) pointed out, the *Règles* themselves provide a basis for accepting both *Endamoeba* and *Entamoeba*. Article 34 states that “a generic name is to be rejected as a homonym when it has previously been used for some other genus of animals.” In connection with rejection of such names as homonyms, Article 36 contains the following recommendation: “It is well to avoid the introduction of new generic names which differ from generic names already in use only in termination or in a slight variation in spelling. But when once introduced, such names are not to be rejected on this account. Examples: *Picus*, *Pica*. . . .”

19. But, if one may question the legal force of a “Recommendation,”

then *Opinion* 147* (Int. Comm. Zool. Nomencl., 1943), as Kirby (1945) has pointed out, specifically delimits the categories of spellings that render generic names homonyms, to those differing by : (1) the use of "ae," "oe," and "e" ; the use of "ei," "i," and "y" ; or the use of "c" and "k" ; (2) the aspiration or non-aspiration of a consonant ; (3) the presence or absence of a "c" before a "t" ; and (4) the use of a single or double consonant. The difference between the prefixes *Endo*— and *Ento*— thus lies outside of the limits imposed by *Opinion* 147.

(b) Selection of type species for *Entamoeba* Chatton, 1910.

20. Kirby has pointed out that Chatton (1910) referred to the genus *Endamoeba* Leidy, 1879, as "*Entamoeba* Leidy." As used by Chatton, it included, as already noted, the type species of Leidy's genus, *Amoeba blattae* Bütschli, 1878, and a number of other species, among them "*Amoeba coli* Lösch" [= *Amoeba coli* Grassi, 1879]. I believe that Chatton unintentionally changed the spelling of Leidy's genus, thus in effect creating a new name for it, which should be termed *Entamoeba* Chatton, 1910. (No previous author spelled Leidy's genus in this way, Schaudinn (1903) and others that used the spelling *Entamoeba* having credited it to Casagrandi and Barbagallo.) Stiles and Boeck (1923 : 123) must have come essentially to the same conclusion when they recognised both *Entamoeba* Casagrandi and Barbagallo, 1895, and *Entamoeba* Chatton, 1912 [=1910]. Their action supports my contention that Chatton thus was actually not dealing with the genus *Entamoeba* Casagrandi and Barbagallo, 1895, his only reference to the latter being in error—namely, that "*Entamoeba*" should be credited to Leidy, not to the Italian workers. *Entamoeba* Chatton, 1910, is a homonym of *Entamoeba* Casagrandi and Barbagallo, 1895 ; but there is no basis for assuming them to be objective synonyms, as the writers of *Opinion* 99 appear to have believed, inasmuch as the type species of the latter genus had not then been determined.

21. We thus actually have three nominal genera : *Entamoeba* Leidy, 1879 (monotypic), *Entamoeba* Casagrandi and Barbagallo, 1895 (2 species), and *Entamoeba* Chatton, 1910 (7 species, including those in the second genus). As Kirby has maintained, the consequence of any action by Chatton (1910, 1912) and Chatton and Lalung-Bonnaire (1912) should affect only the genus with which Chatton originally dealt—which I call *Entamoeba* Chatton, 1910 (= *Endamoeba* Leidy, 1879, emended). This principle was expressly recognized by the Paris Congress of 1948 and is now to be incorporated in the *Règles* (see 1950, *Bull. zool. Nomencl.* **4** : 347–348).

22. I wish now to take up the second point raised by the body of *Opinion* 99, namely, whether Chatton (1910) can be construed as having fixed the type of *Entamoeba* Chatton, 1910. In this connection Article 30 (f) is involved.

* Cancelled, except for historical purposes, and part of its decision to be incorporated into the *Règles* (see 1950, *Bull. zool. Nomencl.*, **4** : 161–162, 165–166).

23. Article 30 Rule (f) states that "in case a generic name without originally designated type is proposed as a substitute for another generic name, with or without type, the type of either, when established, becomes *ipso facto* type of the other." Inasmuch as *Entamoeba* Chatton, 1910, is in effect a substitute for *Endamoeba* Leidy, 1879, it follows that *blattae*, type of the earlier genus by monotypy, automatically becomes type of the latter genus. Therefore, it is difficult to understand why the Commission, in the summary of *Opinion* 99, did not rely on this rule to establish the type species of *Entamoeba* of Chatton (1910) instead of invoking *Opinion* 6, which was not clearly applicable. Actually, Rule (f) in Article 30 has certain difficulties of application to which I hope to draw the attention of the Commission in a separate communication. Possibly it is on the basis of these difficulties that the Commissioners failed to invoke it in the summary of *Opinion* 99. In any event, the application of this rule seems straightforward in the case under consideration.

(c) Selection of a type species for *Entamoeba* Casagrandi and Barbagallo, 1895.

24. We can now examine the third point raised by the body of *Opinion* 99, namely, that Brumpt (1913) may be regarded as having made a statement that, were it not for Chatton's earlier action (1912), would have had the effect of selecting a type species for *Entamoeba* Casagrandi and Barbagallo, 1895. In this connection it also is desirable to determine when such a selection was validly made and also to explore further the consequences of Chatton's treatment of his genus *Entamoeba* (= *Endamoeba* Leidy, 1879). Aside from *Opinion* 6, which has already been shown to be inapplicable, one article in the *Règles* and two *Opinions* are intimately involved in these problems—namely, Article 30 and *Opinions* 45 and 164.

25. Brumpt (1913), as already stated, made the following statement (in translation; for original see footnote 8): "This same genus" [as *Entamoeba* Chatton, 1910 = *Endamoeba* Leidy, 1879] "was created *de novo* in 1897 by Casagrandi and Barbagallo for their *E. hominis*, synonym of *E. coli*." It was on this basis that Stiles and Boeck (1923), Stiles and Hassall (1925), and the Commission (in *Opinion* 99) concluded that what Brumpt's statement amounted to was a potential selection of a type species for *Entamoeba* Casagrandi and Barbagallo, 1895.

26. I feel that this position is inconsistent with the *Règles* and with the previously rendered *Opinion* 45 (Int. Comm. Zool. Nomencl., 1912).

27. Article 30, which deals with the designation, indication, and selection of type species of genera, contains a paragraph following paragraph (g) which reads as follows: "The meaning of the expression 'select the type' is to be rigidly construed. Mention of a species as an illustration or example of a genus does not constitute a selection of type." Several *Opinions* have been rendered specifically dealing with the concept of type selection "rigidly construed." Most of these do not apply to the present case except that all up to *Opinion* 99

demonstrate a strict approach to the question of type selection. *Opinion* 45, however, is of considerable significance to the question under consideration.

28. The summary of *Opinion* 45 reads as follows: "So far as one can judge from the premises submitted, the type of *Syngnathus* Linnaeus, 1758, has never been definitely designated, and there is no objection to designating, as such, the species *acus* Linnaeus to accord with general custom and convenience." Without going into the entire history of this case it can be briefly stated that the genus *Syngnathus* Linnaeus, 1758, with seven original species was restricted by Rafinesque (1810b) to two species—a Linnaean species, *Syngnathus aequoreus*, hence the only one of the original species, and a new species, *Syngnathus punctatus* Rafinesque, 1810. He did not select a type species, nor had any previous author. No type selection was made during the rest of the 19th century. However, Jordan and Evermann (1896:774) gave in the synonymy of "*Syngnathus*, Linnaeus" the following citation: "*Syngnathus*, Rafinesque, Caratteri, 18, 1810 (restricted to *aequoreus*)."
Actually, as is pointed out in *Opinion* 45, Rafinesque (1810a), in the reference cited by Jordan and Evermann, did not mention the genus *Syngnathus*; this was done in the later work (1810b). It was the conclusion of the Commission that Jordan and Evermann did not thereby select a type species for the genus *Syngnathus* Linnaeus, 1758.

29. Now it seems to me that the cases of *Syngnathus* of Jordan and Evermann (1896) and *Entamoeba* of Brumpt (1913) are parallel. In both cases statements, not strictly accurate, were made by later authors about the genera of earlier workers. In neither case was there an unequivocal selection of a type species. Yet the Commission saw fit in the first case to determine that Jordan and Evermann's statement, "restricted to *aequoreus*," was not, "rigidly construed," a type selection, whereas Brumpt's statement, "created *de novo* . . . for . . . *E. hominis*" was such a selection. As indicated, Brumpt's statement erred, for actually Casagrandi and Barbagallo raised *Entamoeba* for two species: "*Amoeba coli*" and "*Amoeba blattarum*."

30. *Opinions* 45 and 99 are, I feel, in essential disharmony on the point discussed. Whereas *Opinion* 99 is the later and might be held as superseding *Opinion* 45, the point in which the latter is inconsistent with the former is the fundamental issue of its case and that of *Opinion* 99 is a secondary issue. I do not believe that the International Commission meant, in effect, to reverse *Opinion* 45 in *Opinion* 99. Furthermore I feel that the decision that Brumpt (1913) selected a type species for the genus *Entamoeba* Casagrandi and Barbagallo, 1895, is inconsistent with the spirit of the phrase "rigidly construed" in Article 30.

31. Having considered Brumpt (1913), we can now return to Chatton (1910). A point, the significance of which has not so far been examined, is that the genus *Entamoeba* Chatton, 1910, actually included the two species placed by Casagrandi and Barbagallo in their genus. Some may argue that in so doing Chatton actually comprehended the Italian workers' genus despite his designation "*Entamoeba* Leidy." This is not necessarily so, however.

A genus is rigidly defined by its type species; unless or until a type species is designated or selected, a given genus is of necessity a plastic entity to a greater or lesser degree. Chatton in effect united *both* Leidy's and Casagrandi and Barbagallo's genus in his *Entamoeba*.

32. What happened, in effect, was that Chatton incorrectly—from the standpoint of priority—included *Entamoeba* Casagrandi and Barbagallo, 1895, in synonymy with his *Entamoeba* (1910); no objection from the standpoint of priority would, however, extend to synonymizing the Italian workers' genus with *Endamoeba* Leidy, 1879, the action that he, in fact, meant to take. Despite the fact that Chatton (1910) must be considered as having automatically designated the type species of *Entamoeba* Chatton, 1910 (= *Endamoeba* Leidy, 1879, emended) as *Amoeba blattae* Bütschli, 1878, this should have no effect on the type of *Entamoeba* Casagrandi and Barbagallo, 1895, a genus which was named independently and not as an emendation of Leidy's name "*Endamoeba*" and which Chatton cannot reasonably be regarded as comprehending in his use of the generic name "*Entamoeba*." *Opinion* 164* (Int. Comm. Zool. Nomencl., 1945a) makes this point clear.

33. The summary of *Opinion* 164 states in part as follows: "When two or more genera are united on taxonomic grounds, such action in no way affects the types of the genera concerned." Thus, even though the type species of *Entamoeba* Chatton, 1910, may be regarded as having been designated, that designation cannot, according to *Opinion* 164, affect the type species of *Entamoeba* Casagrandi and Barbagallo, 1895, which Chatton in effect united with his genus.

34. Although Crawley (1913: 185) listed *Entamoeba histolytica* Schaudinn, 1903, as type species of *Entamoeba*, this cannot be taken as a valid selection of a type species inasmuch as *E. histolytica* was not an originally included species. It is true that the nominal species *Amoeba coli* Lösch, 1875 [= *E. histolytica*], was placed in *Entamoeba* as originally proposed by Casagrandi and Barbagallo (1895), but the organism so identified by them was in actuality the modern *E. coli*.

35. The first unequivocal selection of a type species for *Entamoeba* Casagrandi and Barbagallo, 1895, was made by Dobell (1919: 17–18) as follows: "I shall therefore continue to refer three of the common amoebae of man—namely, *E. coli*, *E. histolytica*, *E. gingivalis*—to the genus *Entamoeba* Casagrandi and Barbagallo, 1895; whilst provisionally I reserve the separate genus *Endamoeba* Leidy, 1879, for the amoeba of the cockroach. On this system, the type species of *Entamoeba* is *E. coli*, and the type of *Endamoeba* is *E. blattae*." Dobell specifically stated that the *E. coli* so cited was based on Grassi's, not

* Cancelled, except for historical purposes, and its decision incorporated into the *Règles* (see 1950, *Bull. zool. Nomencl.* 4: 157, 165–166).

on Lösch's organism. For reasons given in Section VI even his selection encounters technical difficulties.

V. The Status of the Trivial Names "*coli*" of Grassi (1879) and "*histolytica*" of Schaudinn (1903).

36. It is desirable at this point to bring up two questions which are only partly related to *Opinion* 99, but are nevertheless of great significance to the nomenclature of amoebae in man. These questions are respectively the validity of the trivial name *coli* for the large nondysenteric amoebae of man and the validity of the trivial name *histolytica* for the amoebae of human amoebic dysentery.

37. It is very important to ensure the status of the trivial name *coli*, inasmuch as it is universally applied today to the large nondysenteric amoeba of man, known as *Entamoeba*, or *Endamoeba*, *coli*—the species, moreover, which Dobell has designated as type of *Entamoeba* Casagrandi and Barbagallo, 1895. If this cannot be done under the existing rules, the International Commission must be called upon to exercise their plenary powers.

38. As already pointed out in paragraph 8 (i), the trivial name *coli* appeared first in the description by Lösch (1875) of organisms from a patient suffering with dysentery; these unquestionably represented the species now designated *Entamoeba*, or *Endamoeba*, *histolytica*. For detailed historical discussions of the nomenclature of *E. coli* and *E. histolytica* I refer to Dobell (1919) and Stiles and Boeck (1923). It should be remarked, however, that Stiles and Boeck (1923) regarded *Amoeba coli* Lösch, 1875, as representing a mixture of species and contended that Stiles (1892) was the first worker to restrict the name to a single component species—the large nondysenteric amoeba. On this basis, they found it possible to accept the trivial name *coli* as valid under the rules for that form. However, Dobell (1919) has presented compelling evidence that Lösch (1875) dealt essentially with *E. histolytica*. It seems entirely logical on the basis of Lösch's usage to regard *coli* as the correct trivial name for the dysenteric amoeba of man. However, Dobell ingeniously found it possible to reject Lösch's selection on the basis of its being a vernacular name without nomenclatorial status. Lösch wrote as follows: "Da die von mir beschriebenen Amöbe, so viel mir bewusst, überhaupt mit keiner der bisher bekannten Formen vollkommen übereinstimmt, so scheint es mir gerechtfertigt, dieselbe bis auf Weiteres mit einem besonderen Namen zu bezeichnen und nach ihrem Fundorte etwa *Amoeba coli* zu nennen." Dobell pointed out that Lösch's "*Amoeba coli*" was written in ordinary type, not italicised or spaced; he further stated that "there is nothing to indicate that Lösch did not employ it as a mere descriptive term." In view of the wording of Lösch's sentence this last statement by Dobell is considerably strained. However, the latter offered a rational solution to a vexing nomenclatorial problem, one which no reasonable systematist, lacking a legal means of rectifying the situation, would hesitate to follow if he wished to honour the *Règles* without contravening general usage. The alternative without suspension of existing rules is to substitute *coli* for *histolytica*, a procedure which would today disrupt the firmly established

practices of two generations of protozoologists and medical scientists. Since this cannot be done in harmony with the rules and since *coli* is so firmly linked with the large nondysenteric amoeba, there appears to be involved a clear case where strict application of the *Règles* would result in confusion rather than uniformity. It is therefore important that *coli* be secured for the large nondysenteric amoeba of man by the International Commission acting on the plenary powers.

39. It would seem quite illogical, however, in securing *coli* to this end for it to be attributed to the authorship of Lösch. Since Grassi (1879) was the first to apply this trivial name to the large nondysenteric amoeba, it is reasonable to follow Dobell and attribute it to his authorship. On this basis it is necessary to suppress *coli* of Lösch (1875) and validate the otherwise homonymous *coli* of Grassi (1879).

40. It is very important to ensure the status of the trivial name *histolytica* inasmuch as it is universally applied today to the dysenteric amoeba of man.

41. Though Dobell (1919), as mentioned, reviewed in detail the nomenclatorial history of the dysenteric amoeba of man, I find it impossible to follow him in all of his conclusions. He discussed four names (aside from *Amoeba coli*) as possibly referring to this species, which antedate *E. histolytica* Schaudinn, 1903—*Amoeba urogenitalis* of Baelz (1883, p. 237), *Amoeba vaginalis* of Blanchard (1885, p. 15), *Amoeba intestinalis* of Blanchard (1885, p. 15) and “amoeba dysenteriae” of Councilman and Lafleur (1891, p. 405). Dobell advanced reasons for rejecting each of these—Baelz’s and Blanchard’s names as unidentifiable and Councilman and Lafleur’s as an obviously vernacular name. I have already pointed out that Dobell cannot be followed in his rejection of *Amoeba coli* Lösch, 1875, as a systematic name; I believe that the same thing can be said for Councilman and Lafleur’s “amoeba dysenteriae.” They stated: “We have called the organism, which was first described by Lösch under the name *amoeba coli*, the ‘amoeba dysenteriae.’” Inadvertently or through ignorance they merely neglected to capitalize “amoeba.” In regard to the other names cited by Dobell, I have no essential disagreement with his disposition of them. However, even if his rejection of Councilman and Lafleur’s name were followed, the matter could not rest there, as can be seen by the following statement by him (:28): “Whilst it is true that the terms *A. coli* and *A. dysenteriae* were sometimes used correctly as zoological names, yet they were never used with clear specific conceptions before the time of Schaudinn.” The first person to use *Amoeba dysenteriae* as an unquestionably systematic designation was Stiles (1892 : 524–525) in a review of Councilman and Lafleur’s paper (1891). It is true that Stiles credited this name to the latter authors, but this fact makes it no less available. That this is so is demonstrated in *Opinion 4** (Int. Comm. Zool. Nomencl., 1907, 1944a), the summary of which reads as follows: “Manuscript names acquire standing in nomenclature when printed in connection with the provisions of Article 25,

* To be cancelled, except for historical purposes, and its decision incorporated into the *Règles* see *Bull. zool. Nomencl.*, 4 : 145–146, 165–166, 1950).

and the question as to their validity is not influenced by the fact whether such names are accepted or rejected by the author responsible for their publication." The discussion by Hemming in the second edition of this *Opinion* (1944a) makes the availability of such a name as *Amoeba dysenteriae* of Stiles (1892) doubly clear.

42. It might seem, therefore, that, if *coli* of Lösch is suppressed as the trivial name for the dysenteric amoeba, *Amoeba dysenteriae* Councilman and Lafleur, 1891 (or Stiles, 1892), would be the next available name. However, Dobell (1919) either did not know about, or ignored, the name *Amoeba dysenterica* used by Pfeiffer (1888 : 662) as a new name for *Amoeba coli* of Lösch.* Stiles and Boeck (1923), in accepting Lösch's name as being restricted by Stiles (1892) to the nondysenteric amoeba, found it possible also to reject *Amoeba dysenterica* Pfeiffer, 1888, and *Amoeba dysenteriae* Councilman and Lafleur, 1891, on the basis that these were renamings of *Amoeba coli* Lösch, 1879, and for that reason had to follow the last name. It is sufficient to point out, since *Amoeba coli* Lösch, 1875, actually applied to the dysenteric species, and on that account alone the other names cited did likewise, Stiles and Boeck's contention is inappropriate. Thus, with the suppression of *coli* of Lösch (1875), *Amoeba dysenterica* Pfeiffer, 1888, is the next unquestionably and validly applied name for the dysenteric amoeba. However, it is impractical to consider substituting *dysenterica* of Pfeiffer (1888) for *histolytica* of Schaudinn (1903). This is clearly a case where strict application of the *Règles* would result in confusion rather than uniformity. The best interests of science will be served by retention of the specific name *Entamoeba histolytica* Schaudinn, 1903 (the next available name for the dysenteric amoeba after *Amoeba dysenterica* Pfeiffer, 1888, and *Amoeba dysenteriae* Councilman and Lafleur, 1891), the trivial name *histolytica* now being universally employed in the zoological and medical fields. In so doing the International Commission must suppress all previous potential or actual synonyms of the trivial name *histolytica*.

43. It is highly important that the International Commission give attention to the names of these important amoebae in man. A formal recommendation in that connection is made in the final section of this paper.

* Pfeiffer wrote: "Im Jahr 1875 folgt alsdann die erste ausführliche und genaue Beschreibung von Lösch in St. Petersburg . . . Dessen *Amoeba coli* s. *dysenterica* Lösch hat so viel Aehnlichkeit mit den aus dem Bläscheninhalt von Vaccine, Herpes, Varicella, etc., abgebildeten grossen Zellgebilden dass morphologisch und nach den Bewegungserscheinungen keine Trennung möglich ist." ["In 1875 then follows the first detailed and precise description—by Lösch in St. Petersburg . . . *Amoeba coli* or *dysenterica* Lösch has so much similarity to the large cell structures that have been pictured with the vesicular inclusions of vaccinia, herpes, varicella, etc., that no distinction is possible, either morphologically or on the basis of the appearance of their movements."] In subsequent discussion Pfeiffer referred to Lösch's form as *Amoeba coli* rather than *Amoeba dysenterica*. Lösch did not employ the word "dysenterica" as a trivial name; that name must therefore be credited to Pfeiffer.

VI. The status of the generic names "*Endamoeba*" Leidy, 1879, "*Entamoeba*" Casagrandi and Barbagallo, 1895, and certain others applied to Enteric Amoebae.

44. The genus *Endamoeba* Leidy, 1879, with its type species *Amoeba blattae* Bütschli, 1879, has already been placed on the "Official List of Generic Names in Zoology" in *Opinion* 95 (Int. Comm. Zool. Nomencl., 1926). This action is completely supported by the *Règles*.

45. The genus *Entamoeba* Casagrandi and Barbagallo, 1895, has been shown to be independent of *Endamoeba* on an orthographic basis. However, its exact nomenclatorial status has not yet been considered herein. At this point it is necessary to consider the status of *Entamoeba coli* as type species of *Entamoeba*. We have already seen (paragraph 8 (v)) that the Italian workers originally included in their genus the species "*Amoeba coli* (Lösch)" and "*Amoeba blattarum* (Bütschli)" [= *Amoeba blattae* Bütschli]. But the organism called "*Amoeba coli*" by them and later (Casagrandi and Barbagallo, 1897) renamed *Entamoeba hominis* was clearly not the dysenteric amoeba, to which Lösch's name applied, but the large nondysenteric form. Thus Dobell in selecting *Amoeba coli* as the type species of *Entamoeba* Casagrandi and Barbagallo, 1895, was so doing on the basis of an originally misidentified species. It is true that he corrected the initial error by properly identifying the species that the Italian workers had misidentified. However, the case still requires the attention of the Commission as prescribed in *Opinion* 168* (Int. Comm. Zool. Nomencl. 1945b), the title of which reads "On the principles to be observed in interpreting Article 30 of the International Code in relation to the names of genera based upon erroneously determined species. . . ." In the summary it is requested that, where such a case has been discovered, it "should be submitted with full details to the International Commission on Zoological Nomenclature and . . . that, pending their decision thereon, the genus should be regarded as a doubtful status." It may be remarked here that what is true of *Entamoeba* Casagrandi and Barbagallo, 1895, is equally true of *Löschia* Chatton and Lalung-Bonnaire, 1912, for which "*E. coli* Lösch" [= *Amoeba coli* Grassi, 1879] was also designated as the type species.

46. It therefore follows that *Entamoeba* Casagrandi and Barbagallo, 1895 (as also *Löschia* Chatton and Lalung-Bonnaire, 1912), as a genus based on a misidentified type species, is technically of doubtful status. Actually, there is no question of the practical application of either *Entamoeba* or *Endamoeba* to certain enteric amoebae of man; such is essentially universal. But it is important that the matter be legally clarified.

47. The question may well arise in view of the general confusion in the medical literature over the spelling of the genus used for the dysenteric and large nondysenteric amoebae of man, *Endamoeba* being quite general in the

* Cancelled, except for historical purposes, and its decision incorporated into the *Règles* (see 1950, *Bull. zool. Nomencl.*, 4: 158-159, 165-166).

United States and *Entamoeba* in Britain, whether there ought to be independent genera *Endamoeba* and *Entamoeba*, which have been accepted as such by Dobell (1938), Kirby (1945), and others. Admittedly the close similarity of the names is regrettable. However, from the practical standpoint, no real difficulty should be encountered, for *Endamoeba blattae* and its congeners, being parasitic in insects, are of no particular consequence to medical scientists. Those zoologists that deal with insect parasites can be expected to be familiar with their nomenclature and are not likely to confuse the two genera; whereas the spelling *Endamoeba* as applied to amoebae in vertebrates may be some time a-dying in the general medical literature, this fact need not disturb scholars concerned with the real genus *Entamoeba*. There does not seem, therefore, to be any real objection to the coexistence of two independent genera with the names *Endamoeba* and *Entamoeba*.

48. The way thus seems well indicated. The International Commission should validate *Entamoeba* Casagrandi and Barbagallo, 1895, a genus based on an originally misidentified species as type species, for which the species *Amoeba coli* Grassi, 1879 (non Lösch, 1875) should be designated, Dobell's selection being thereby validated.

49. Dobell (1938) expressed the conviction that the dysenteric and non-dysenteric amoebae of man should be placed in separate genera. Although he has not himself done this formally, it would also be well for the International Commission to recognise the generic name that would be used for the dysenteric amoeba in case the proposed separation becomes generally recognised. As mentioned in paragraph 8 (vii), *Poneramoeba* was erected by Lühe (1909) with *Entamoeba histolytica* Schaudinn, 1903, as only species and therefore as type species. As first genus after *Entamoeba* available for the dysenteric amoeba, it would come into use. The International Commission might also permanently sink *Löschia* Chatton and Lalung-Bonnaire, 1912, by validating *Amoeba coli* Grassi, 1879, as its type species, thereby rendering it an objective synonym of *Entamoeba* Casagrandi and Barbagallo, 1895.

50. *Entamoeba* Casagrandi and Barbagallo, 1895, and *Poneramoeba* Lühe, 1909, with their respective type species, should therefore join *Endamoeba* Leidy, 1859, on the "Official List of Generic Names in Zoology."

VII. Conclusions and Recommendations.

51. The conclusions and recommendations of the present study are in three categories: those that relate to *Opinion* 99 itself; those that relate to the trivial names *coli* and *histolytica*; and those that relate to the generic names *Entamoeba* Casagrandi and Barbagallo, 1895, and *Poneramoeba* Lühe, 1909. The first are covered under paragraph 52; the second under paragraphs 53-55; and the third under paragraph 56.

52. I feel that it is necessary, and I hereby request, that the International Commission on Zoological Nomenclature should render an *Opinion* in which they first cancel *Opinion* 99 on the ground that the decision set forth therein is incorrect and misleading in certain important respects, and second make the following points, in substitution for those made in the *Opinion* so cancelled :

- (i) The nominal genus *Entamoeba* Casagrandi and Barbagallo, 1895, was established independently of the nominal genus *Endamoeba* Leidy, 1879, the name *Entamoeba* as used by Casagrandi and Barbagallo being neither an accidental misspelling nor an emendation of the name *Endamoeba* as previously used by Leidy. Under Articles 34 and 36, the names *Endamoeba* and *Entamoeba* are not homonyms of one another.
- (ii) Chatton (1912) did not select a type species for the genus *Entamoeba* Casagrandi and Barbagallo, 1895. In fact the supposed action of Chatton (1912) on the basis of which type selection was to be inferred according to the *Opinion* actually was originally carried out by Chatton and Lalung-Bonnaire (1912). The genus with which these authors had dealt was *Endamoeba* Leidy, 1879, to which Chatton himself in 1910 had applied the name *Entamoeba* as a tacit emendation of the name *Endamoeba*. Further, even if Chatton and Lalung-Bonnaire (1912) had been dealing with *Entamoeba* Casagrandi and Barbagallo, 1895, instead of with *Entamoeba* Chatton, 1910 (*emend. pro Endamoeba* Leidy, 1879), the action which they then took would not have constituted a valid selection of *Amoeba blattae* Bütschli, 1878, as the type species of that genus, for they did not make a definite type selection under Rule (g) in Article 30, nor did their action constitute such a selection under the special provisions of *Opinion* 6.
- (iii) Brumpt's action in 1913 did not constitute a valid selection of a type species for *Entamoeba* Casagrandi and Barbagallo, 1895, for Brumpt did not comply with the requirements of Rule (g) in Article 30.
- (iv) The first author definitely to select a type species for *Entamoeba* Casagrandi and Barbagallo, 1895, was Dobell (1919), who so selected *Amoeba coli* Grassi, 1879. This selection has been accepted by subsequent authors, but it must be noted that Casagrandi and Barbagallo (1895) did not include this nominal species in the genus *Entamoeba*, the name which they did so include being "*Amoeba coli* (Lösch)," which is the name for a different species, being the dysenteric amoeba of man now universally known as *Entamoeba histolytica* Schaudinn, 1903. On the other hand, it cannot be doubted that the species which Casagrandi and Barbagallo referred to as "*Amoeba coli* (Lösch)" was the species now universally identified as the large nondysenteric amoeba of man, *Amoeba coli* Grassi, 1879. Thus, the genus *Entamoeba* Casagrandi and Barbagallo, 1895, is one based on a misidentified type species. In these circumstances the Commission, acting under the instructions given to it by the International Congress of Zoology as to the action to be taken in any such case where the Commission is satisfied that

confusion would result from the strict application of the *Règles*, should hereby use their plenary powers to designate *Amoeba coli* Grassi, 1879, to be the type species of the genus *Entamoeba* Casagrandi and Barbagallo, 1895, thus validating Dobell's selection.

53. It is necessary, if serious confusion is to be avoided, that the trivial names of the large nondysenteric and the dysenteric amoebae of man should be placed on an unassailable foundation. The problems arising in connection with the specific names *Amoeba coli* Grassi, 1879, and *Entamoeba histolytica* Schaudinn, 1903, are accordingly summarized in the following paragraphs.

54. Two points arise in connection with the name *Amoeba coli* Grassi, 1879: (1) whether this is an available name; and (2) whether it undoubtedly represents the large nondysenteric amoeba of man. As regards (1), the name *Amoeba coli* Grassi, 1879, is not an available name because of the prior *Amoeba coli* Lösch, 1875, which applies to the dysenteric amoeba. However, in view of the universal use of *coli* for the nondysenteric amoeba and the grave confusion which would result if this name had now to be discarded on technical nomenclatorial grounds, I recommend that this particular difficulty should be overcome by the Commission using its plenary powers to suppress the trivial name *coli* Lösch, 1875 (as published in the binominal combination *Amoeba coli*) and validate the trivial name *coli* Grassi, 1879 (as published in the binominal combination *Amoeba coli*). As regards (2), there is no reasonable doubt as to the principal species to which Grassi applied the name *coli*, but I recommend that, in order to settle this matter beyond dispute, the Commission should apply in this case the procedure which they adopted in Paris for the purpose of determining the identity of the species to which the trivial name *iris* Linnaeus, 1758 (as published in the binominal combination *Papilio iris*) should apply (see 1950, *Bull. zool. Nomencl.* **4**: 359-361)—that is, that the Commission should use its plenary powers to direct that the name *coli* Grassi, 1879 (as published in the binominal combination *Amoeba coli*) should be the trivial name of the large nondysenteric amoeba of man as definitively described and figured by Dobell (1919, pp. 78-92; pl. i, figs. 12-15; pl. ii, fig. 17; pl. iv, fig. 55-69).

55. The name *Entamoeba histolytica* Schaudinn, 1903, is universally applied to the dysenteric amoeba of man and the greatest confusion would result if it were necessary to change this practice for some technical nomenclatorial reason. On the other hand, there is no doubt that there are at least three older names for this species, namely, *Amoeba coli* Lösch, 1875, *Amoeba dysenterica* Pfeiffer, 1888, and *Amoeba dysenteriae* Councilman and Lafleur, 1891 (or Stiles, 1892). In addition, there are three other names which may have been applied to this species, namely: (1) *Amoeba urogenitalis* Baelz, 1883, (2) *Amoeba vaginalis* Blanchard, 1885, and (3) *Amoeba intestinalis* Blanchard, 1885. Accordingly, in order to provide an unquestionably valid title for the trivial name *histolytica* Schaudinn, 1903 (as published in the binominal combination *Entamoeba histolytica*), I recommend that the Commission, in addition to suppressing the trivial name *coli* Lösch, 1875 (as published in the binominal combination *Amoeba coli*), as recommended in paragraph 54 above, should

use their plenary powers to suppress the under-mentioned trivial names and, having done so, should place those names (with *coli* Lösch, 1875) on the "Official Index of Rejected and Invalid Specific Trivial Names in Zoology": (a) *urogenitalis* Baelz, 1883 (as published in the binominal combination *Amoeba urogenitalis*); (b) *vaginalis* Blanchard, 1885 (as published in the binominal combination *Amoeba vaginalis*); (c) *intestinalis* Blanchard, 1885 (as published in the binominal combination *Amoeba intestinalis*); (d) *dysenterica* Pfeiffer, 1888 (as published in the binominal combination *Amoeba dysenterica*; and (e) *dysenteriae* Councilman and Lafleur, 1891 (or Stiles, 1892) (as published in the binominal combination *Amoeba dysenteriae*). Finally, as in the case of the trivial name *coli* Grassi, 1879, I recommend that the Commission should use its plenary powers definitely to attach the trivial name *histolytica* Schaudinn, 1903 (as published in the binominal combination *Entamoeba histolytica*) to the dysenteric amoeba of man as now recognized by specialists. I recommend that this object should be secured by the Commission directing that the trivial name *histolytica* Schaudinn, 1903, is to be the trivial name for the species as definitively described and figured by Dobell (1919, pp. 31-70; pl. i, figs. 1-6; pl. ii, fig. 16; pl. iii; pl. iv, figs. 70-76).

56. While it is of the first importance that the trivial names of these amoebae should be firmly established, it is also necessary that the generic name *Entamoeba* Casagrandi and Barbagallo, 1895, be stabilized by being placed on the "Official List of Generic Names in Zoology" (type species *Amoeba coli* Grassi, 1879 [syn. *Entamoeba coli* (Grassi, 1879) Schaudinn, 1903], to be validated by the International Commission through the invocation of their plenary powers). In view of the fact that such an authority as Dobell felt that generic separation of the dysenteric and large nondysenteric amoeba of man will have to be carried out, it would also be well for the International Commission to place *Poneramoeba* Lühe, 1909 (type species *Entamoeba histolytica* Schaudinn, 1903, by original designation), first genus available for the dysenteric amoeba of man, on the "Official List." These two generic names would thereby join *Endamoeba* Leidy, 1879 (type species *Amoeba blattae* Bütschli, 1878 [syn. *Endamoeba blattae* (Bütschli, 1878) Leidy, 1879], by monotypy), already placed on the "Official List" under a decision taken in *Opinion* 95. The foregoing actions are hereby recommended.

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