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A CHAPTER IN THE HISTORY OF ZOOLOGICAL NOMENCLATURE

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By LEONHARD STEJNEGER

It seems unavoidable that questions, which during the progress of science have caused controversies and then become settled by compromise or otherwise, should reappear from time to time and then give rise to renewed agitation and a restatement of the old arguments. Sometimes such resurrection of old issues is due to the growth or development of science itself, but often it arises from lack of first-hand knowledge of the previous history of the question and its disposal. Much energy and time have been wasted in thus threshing over old straws, simply because there was not at hand a comprehensive historical account of the processes which led up to the final settlement—or rather the settlement which it was intended should be final.

It is hoped that the following recount of the steps by which agreement was secured with regard to certain phases of the International Zoological Code of Nomenclature may prevent the recrudescence of an old controversy which it took twenty years to settle when it was up the last time. This is the more to be desired as the result then achieved has stood the test of twenty years' experience.

I. SPECIFIC NAMES BEFORE 1758

Before proceeding, it may be well to clear up one common misconception, namely, that the zoological nomenclature, the origin of which is usually credited to Linnaeus, did appear suddenly as something entirely new.

The genus concept, such as we recognize it even today, as well as the generic name, such as we employ it today, are due to Tournefort and other predecessors of Linnaeus. As an almost necessary corollary, so were the species concept and the species designation. But Linnaeus was the first to give them *universal* application by his "methodus nova," by which he outlined and defined logically a rigid set of named categories, into which he fitted all the objects of nature known to him.

Linnaeus' Systema Naturae was not only intended to be an exposition of systematic zoology, but it was also to be what nowadays we might call a check-list of names. This is perfectly plain from an inspection of the very first edition of 1735. Even at that early time he stressed the point that the method of natural history consists in "Divisio *ac* Denominatio." It has been said that in the first and the second editions (1740) he only treated of the genera. That is only a partial truth. The title proclaims it to be a systematic presentation of the three Kingdoms of Nature by "classes, ordines, genera & species," and the contents do not belie the title page. It is true that only the genera are characterized, but the species are named, and what is more, mostly binominally. However, they are not diagnosed, so that they are what we now understand by "*nomina nuda,*" but they are *nomina,* nevertheless.

But whether we accept the contention of those who prefer to call the plurinominal designations of the later editions "differentiae" and not "nomina" is of no moment, as this argumentation is merely a juggle with words. The fact is that before 1758 Linnaeus himself, when he wanted to refer to a species *by name,* say for instance the species of the Golden Pheasant, would have to write *Phasianus crista flava, pectore coccineo* (Syst. Nat., Ed. 6, 1748, p. 28) and there can scarcely be any doubt that this is the "*Nomen selectum; genericum & specificum Authoris cujusdam* (*si quod tale*) *vel proprium*" to which he refers (*op. cit.,* p. 222). Who would have the hardihood to deny that *Dasypus cingulis novem* or *Dasypus cingulis septem* were *names* given them by Linnaeus in 1748 just as much as the names *Dasypus novemcinctus* and *D. septemcinctus* bestowed upon them in 1758? Moreover, such designations as *Lernea lepus marinus, Aphrodita mus marinus, Medusa urtica astrophyta* (*op. cit.*) can scarcely be referred to as "differentiae" if by that term something else is meant than by "nomina." Finally, the 1748 edition is, to a very great extent, *binominal,* though the principle is not carried through consistently until the 1758 edition. To show this, it is only necessary to reprint, out of many examples, his list of the species of the genus *Parus* of 1748 (p. 32).

83. Parus. Rostrum subulatum.

Linguae apex truncatus, terminatus setis quattuor.

1. Parus major. *Fn.* [Fauna Svecica, 1746] 238.
2. Parus cristatus. *Fn.* 239.
3. Parus caeruleus. *Fn.* 240.
4. Parus ater. *Fn.* 241.
5. Parus palustris. *Fn.* 242.
6. Parus caudatus. *Fn.* 243.

Compare this with the tenth edition, 1758, pp. 189-190, where we have the following:

100. PARUS. *Rostrum* integerrimum.
Lingua truncata, setis terminata.

The accepted "binominal" names of the above six species are enumerated as follows:

1. Cristatus.
2. Major.
4. Caeruleus.
5. Ater.
6. Palustris.
7. Caudatus.

Surely here is no difference; nor is it likely that anybody may argue that this binominalism is incidental or accidental.

While thus 1758 does not in itself mark a sudden revelation in zoological nomenclature, this year, after the long and painful experimentation by the zoologists with another year (1766), has come out victorious as a starting point chiefly on account of practical considerations.

The fact is that while Linnaeus was a master methodologist and a great systematic naturalist, there were among his contemporaries men who in their more limited fields possessed a wider and deeper insight than Linnaeus himself. They were so closely synchronous with him that he could not benefit by their work and they had hardly time, if they had the inclination, to adapt their own writing to his. Nevertheless, their influence upon their special branches has been so profound, that their successors a hundred years after have insisted on preserving at least so much of the zoological nomenclature originating with them as could be reconciled with, or rather as coincided with, that of the great Swede. By selecting 1758 as a starting point, it became possible to recognize all mononominal generic names originating after that date, although the species designations might be inapplicable.

It has been asserted repeatedly that by admitting the genera of binarists, who after 1758 were not also binominalists, we are guilty of inconsistency by recognizing authors who were not "playing the Linnaean game." But, when did Linnaeus himself begin to play the game? Surely not in 1758. He began it in 1735 with the "Systema Naturae sive regna tria naturae systematice proposita per classes, ordines, genera, & species" as the title page has it, and as it was repeated with slight verbal changes in each of the following editions (2^{d}, 6th and 10th) brought out by Linnaeus himself. Gradually the

game developed. The sixth edition (1748), as already shown, contained a large number of binominal specific names—not incidentally or accidentally, but intentionally so—and in 1753 only five years after the sixth edition, Linnaeus carried out the binominal system consistently as far as the plants were concerned. Five years later (10th ed.) he carried it out equally consistently for the animals. For practical reasons given above, the recent codes of zoological nomenclature decided to start with 1758, and not because this edition initiated a new "game"; it only inaugurated its consistent general application. If then Linnaeus himself did not play a new game in 1758 and after, surely those who had followed him thus far still played the same game, as I shall demonstrate later on (Brisson, p. 18).

It was also for practical reasons that generic denominations dating from before 1758 have been excluded much against the protest of the French zoologists.

II. BINARY AND BINOMINAL

Fortunately the word *binominal*[1] presents no serious difficulty. Except in a few isolated cases of carelessness, it is used by all authors to designate a system of nomenclature in which both the genus designation and the species designation each consist of a single word.

Much mischief has been caused by the introduction and common synonymizing of the term *binomial* with the above. Many authors have even gone so far as to intimate that it is an "abbreviation" for binominal. The two words are from different roots and ought to mean different things, but it matters little, for *binomial* has been commonly used indiscriminatingly for binominal. Properly it ought to mean the same as binary of Opinion 20 of the International Commission, and has been so used by some authors.

Binary, however, is the word about which much controversy has been raging. Etymological dictionaries have been consulted as to its origin and meaning; zoological literature has been searched so as to trace its application; its use by individual writers has been analyzed in order to interpret its hidden meaning. And everybody has interpreted it to suit himself. The Latin word *binarius,* meaning simply "that which consists of two," lends itself admirably to such interpretation. Some argued that binary nomenclature referred to names consisting of two *terms,* others that it referred to names consisting of two *words.* To some it was synonymous with *binomial,* to others with *binominal,* and as most authors confused binomial and binominal,

[1] The Latin adjective *binominis*=cui geminum est nomen, ut Numa Pompilius, Tullus Hostilius.

naturally they also confused binary and binominal. And there is no denying the fact that the three words have been used most loosely and almost indiscriminately by nearly everybody. With one notable exception: the International Zoological Code of Nomenclature.

We are not interpreting the meaning of this ambiguous word as it has been used by this or that author, by this or that code. We are not investigating who used it first in this or that connection; nor who defined it first in this or that way. The only question before us is: What is its meaning in the present International Code and how did it come to have that meaning?

III. THE INTERNATIONAL CODE

During the seventies and the beginning of the eighties of the last century the zoological nomenclature was on the verge of chaos due to the fact that the old Stricklandian Code because of its inherent weaknesses, its many exceptions, and inconsistencies, its vagueness, and the freedom it offered to individual interpretation, was celebrated more in the breach than in the observance. Practically every taxonomist followed his own rules, or rather his own preferences or taste. Great changes in long familiar names were the order of the day due to the discovery of overlooked early publications or to the substitution of the 1758 edition of Linnaeus' Systema Naturae for the 1766 edition, or to the fact that generic names in zoology had been rejected or retained, as the case might be, because of, or in spite of, their having also been applied to plant genera, etc., etc. At the same time the question of naming subspecies by applying a third term to the specific name, thus introducing a trinominal nomenclature, was becoming acute and pressed for a solution. The result was that two lists of the same group of animals from the same region, but by different authors, might be so unlike as to perplex even the most expert professional.

The Committee on Zoological Nomenclature of the American Association for the Advancement of Science, taking cognizance of this condition, published in 1877 an exhaustive report submitted at its request by Dr. W. H. Dall (Proc. Amer. Assoc. Adv. Sci., Nashville, 1877, pp. 7-56), in which the whole question was thoroughly discussed. It embodied the views of a large number of American taxonomists. This report is of great importance as setting forth the various opinions and arguments, but it did not lead to definite results with regard to some of the most debated points, such as a single definite date for starting the zoological nomenclature, though it made the recommendation that no specific names are to be recognized if

proposed before 1758. With regard to genera the idea seems to have been that some "epoch-making work," from which the nomenclature is to start, may be determined for each class or greater group by the students specializing in the same. It is incidentally pointed out that G. R. Gray, in 1841, "adopts the first edition of the Systema (1735) as the epoch-maker for ornithological genera. For specific names he does not go behind the tenth edition." It should be noted that the recommendations of the report aim at bringing about as near an approach between the zoological and the botanical codes of nomenclature as possible without making them identical.

The ornithologists have always been active in nomenclatorial matters so that it was quite natural that at the founding of the American Ornithologists' Union in 1883, one of its first acts was to create a committee to which was referred "the question of a Revision of the Classification and Nomenclature of the Birds of North America." The committee soon realized that no such revision could be undertaken without a discussion of the general principles of zoological nomenclature, a discussion which resulted in the formation of a Code of Rules for the guidance of the committee. "These rules were considered in their bearing upon zoology at large as well as upon ornithology alone, it being obvious that sound principles of nomenclature should be susceptible of general application." In publishing the Code (The Code of Nomenclature . . . . adopted by the American Ornithologists' Union. New York, 1886) the hope was expressed "that the new Code will find favor, not only with ornithologists generally." This hope was speedily realized as numerous American zoologists, specialists in all classes of the animal kingdom, publicly announced their adherence to the A. O. U. Code, as it came to be known.

While ostensibly based upon the Stricklandian rules, nevertheless the new Code marked a decided departure in zoological nomenclature based as it was upon the principle of an inflexible and exceptionless law of priority, and framed with the express purpose of allowing the least possible play for individual preferences and prejudices. Moreover, it broke definitely with the old "binomial" nomenclature consisting in the application of "two names, one of which expresses the specific distinctness of the organism from all others, the other its superspecific indistinctness from, or generic identity with, certain other organisms, actual or implied; the former name being the specific, the latter the generic designation; the two together constituting the technical name of any specifically distinct organism." The A. O. U. Code only regards "the binomial system as a phase of zoological nomenclature." The "trinomial system" is another phase

of zoological nomenclature. The code furthermore provides (canon 12) that "the law of priority begins to be operative at the beginning of zoological nomenclature" and (canon 13) "zoological nomenclature begins at 1758, the date of the 10th edition of the 'Systema Naturae' of Linnaeus." Note well: zoological nomenclature, not binomial nomenclature, nor Linnaean nomenclature! Note also the following reasons given by the committee for dissenting from previous codes in rejecting 1766 as a starting point (p. 36): "This date [1758] admits to recognition the works of Artedi, Scopoli, Clerck, Pallas, Brünnich, Brisson, in favor of the first-named two of whom, and of the last-named one, the B[ritish] A[ssociation] Committee have had to make special exceptions." In a footnote the Article 2 of the original B. A. Code (1842) is quoted, which admitted the genera of Brisson: "But Brisson still adhered to the old mode of designating species by a sentence instead of a word, and therefore while we retain his defined genera we do not extend the same indulgence to the titles of his species, even when the latter are accidentally binomial in form." The argument winds up as follows (p. 38): "It seems best that the origin of generic names in zoology should date (as said above) only from 1758 [and not from Tournefort 1700 or Linnaeus 1735]; that names adopted from earlier authors by Linnaeus date only from their adoption by Linnaeus; and that in other cases pre-Linnaean names shall date from their introduction by subsequent authors after 1758." It is thus plain that the A. O. U. Code admits all truly generic names proposed after 1758 whether the author is a binominalist or not. The generic names of Gronovius, 1763, are consequently admissible under that code. It may be further noted that in Dall's codification of 1877 and the A. O. U. Code of 1885, only the word *binomial* is used and nowhere the word *binary*.

In the meantime the zoologists on the continent of Europe had also begun to agitate the question of more modern rules of nomenclature. Again it was an ornithologist who first stirred up the question. In 1872 Carl J. Sundevall, the eminent Swedish zoologist, published a book on the natural system of the birds, and in the introduction which was written both in Swedish and French he has a chapter entitled "Remarques sur les noms systematiques" (Methodi Naturalis Avium Disponendarum Tentamen, Stockholm, 1872, pp. lix-lxix). As far as species names are concerned, he was an early and consistent defender of 1758 as a starting point. He wrote (p. lxii): "C'est de ces dates [1758 in zoology and 1751 in botany] que commencent les noms spéciaux; mais les noms génériques sont plus anciens. Dans la botanique, ils furent introduits comme principe général par Tourne-

fort en 1694; dans la zoologie ils commencent proprement avec la première édition du *Systema Naturae* de Linné, de 1735, qui est le premier ouvrage ou les genres font partie essentielle du système dans la zoologie, et ils y sont exposée à travers tout le règne animal." This principle, which was none other than that first introduced by the equally eminent English ornithologist, G. R. Gray, in the second edition of his Genera of Birds (1841), the year before the issue of the B. A. Code, namely, one starting point for the names of genera and another for those of species, was rather universally accepted by those who clamored for a revision of the Stricklandian Code. But even among those who favored starting the binominal nomenclature from 1766, the principle was recognized that the status of an author's generic names is not influenced by his adherence to the mononomial (univocal) species designation, as shown by the following quotation from an article by Alfred. Newton, one of the stanchest defenders of the binominal system and a member of the revision committee: "His [Brisson's] genera are brought in [into the revised Stricklandian Code of 1865] by a special enactment; but once admitted, they are exactly on the same footing, to stand or fall, as those of anybody else. His specific names, we know, are rejected, but that is simply because he did not adhere to the binomial system of nomenclature which we adopt, and very rightly they are rejected. Had his book been published a few years later, or had the [B. A.] Code enacted that the 10th edition of the 'Systema' should be the point of departure, there would have been no need to treat him exceptionally as regards his genera." (Ibis (3), vol. 6, 1876, p. 103.)

In France the whole question was reopened in 1879 curiously enough not by the zoologists but by the First International Geological Congress in Paris. A Committee was appointed to formulate "Règles à suivre pour établir la nomenclature des espèces." The members of the paleontological section residing in Paris (Cotteau, Douvillé, Gaudoy, Gosselet, Pomel, and de Saporta) consequently submitted to the second International Geological Congress in Boulogne, 1881, a uniform code for zoology and botany, "prenant pour point de départ le code Strickland," under the title "Règles proposées par le Comité de la Nomenclature paléontologique" (Congrès Géologique International, Compte Rendu de la 2me Session, Boulogne, 1881, pp. 594-595), consisting of only 11 brief articles, but accompanied by a "Rapport" by Douvillé. The principle accepted is clearly expressed in article 1, which reads as follows: "La nomenclature exclusivement adoptée est la nomenclature binominale, dans laquelle chaque individu est désigné par un nom de genre et par un nom d'es-

pèce" and by article 4a: "Il n'y a pas lieu de fixer dans le temps une limite à la loi de priorité; toute dénomination générique ou spécifique conforme aux règles de la nomenclature binominale devra être adoptée, même si elle est antérieure à Linné." In his "rapport" Douvillé elaborates this principle further by referring to Tournefort who in 1700 "répartit l'ensemble du règne végétal en un certain nombre de *genres* comprenant chacun une série d'*espèces,* caractérisées par leur *différences*" (p. 596).

Stirred by the action of the geologists the Zoological Society of France in the meantime (January 11, 1881) decided not to stand aside as a spectator but to take an active part in the discussion. A commission, consisting of Blanchard, Chaper, Jousseaume, Jullien, Künckel d'Herculais, Lataste, and Simon, was appointed charged with preparing "un corps de règles applicables à la nomenclature des êtres organisés"—consequently covering the same field as the paleontological committee. The commission promptly submitted during the same year a code of "Règles," almost as brief as that of the paleontologists, consisting as it did of only 17 articles, and accompanied by a "Rapport" by Mr. Chaper. It is first to be noted that the zoologists follow the paleontologist in accepting Tournefort as father of the system of generic-specific nomenclature, and consequently in not incorporating in the code a definite date as a starting point for the generic and the specific denominations, both affirming in the identical language that "le nom attribué à chaque genre et à chaque espèce est celui sous lequel ils ont été le plus anciennement désignés" (Paleont. Code, art. 3; Zool. Code, art. 11). Altogether, the two codes are based essentially on the same principles, embodied in the same language, and but slightly altered in the sequence of their articles. Thus articles 1 and 2 of the Paleontological Code correspond to articles 1-7 of the zoologists' code; 8, 9 and 10 of the former are identical with 8 and 9 of the latter. Article 10 of the zoological code is additional and refers to the names of families. P. C. articles 3-5 correspond to the Z. C. art. 11, and P. C. 5 has become Z. C. 12 and 13; 6 has become 14; and 7 embraces 15 and 16. Article 17 of the zoologists' code is additional and provides only for the rejection of a later name having in Latin a pronunciation so little different from the earlier one that confusion might arise.

But while thus there is general agreement both in principle and verbal expression, there is a significant amplification of one phrase in the zoological code which merits special consideration.

Article 1 of the Paleontological Code began as follows: "La nomenclature exclusivement adoptée est la nomenclature *binomi-*

nale," and article 4*a* provides: "toute dénomination générique ou spécifique conforme aux règles de la nomenclature *binominale* devra être adopté, même si elle est antérieure à Linné." The zoologists, however, at once realized the inadequacy of this "definition de la nomenclature" well knowing (as did the paleontologists of course) that there was no binominal nomenclature before Linnaeus. They felt the incongruity of calling the system of Tournefort and of Linnaeus, before the introduction of the univocal *nomen trivialis, binomiNal,* and they consequently set about to rectify this clumsy and ambiguous expression, and in the code submitted by them, the first paragraph of article 1 took this form: "La nomenclature adoptée pour les êtres organisés est *binaire* ET *binominale."* As a consequence Art. 11*b* which took the place of 4*a,* quoted above, came to read as follows: "Le nom attribué à chaque Genre et à chaque Espèce ne peut être autre que celui sous lequel ils ont été le plus anciennement désignés, à la condition: que l'auteur ait effectivement entendu appliquer les règles de la nomenclature *binaire."* Thus the ludicrous reference of the paleontologists to a binominal nomenclature before Linnaeus was gotten rid of.

We are here, for the first time in *this* chapter of the history of zoological nomenclature, introduced to the term "nomenclature binaire," which has since been translated into English as "binary nomenclature," for the definition of which the English dictionaries have been so inconsequently consulted! While there is no explanation of the terms in the accompanying "Rapports," probably for the reason that the framers of the code of the Zoological Society of France found it so obvious that no further definition seemed necessary, there can, of course, be no doubt as to the meaning, viz., that generic names by binarians, even if proposed before the general introduction of the binominal nomenclature, should not be rejected, a principle to which the French, both zoologists and paleontologists, were positively committed.

The Zoological Society of France did not rest with the adoption of this code, but after having taken the initiative in calling the first International Zoological Congress at Paris in 1889, a more detailed code based on the principles of the one already adopted by the society and employing the identical phraseology was introduced, accompanied by a "Rapport" by Dr. R. Blanchard. These "Règles" were further elaborated and commented on at the second meeting at Moscow, 1892, when the first code of the International Zoological Congress, consisting of 63 articles, was there adopted. The articles discussed above have now (1892) the following phraseology:

"ART. 1. La nomenclature adoptée pour les êtres organisée est binaire et binominale. . . . .

"ART. 44. Le nom attribué à chaque genre et à chaque espèce ne peut être que celui sous lequel ils ont été le plus anciennement désignés, à la condition: . . . .

"*b*. Que l'auteur ait effectivement entendu appliquer les règles de la nomenclature binaire.

"ART. 45. La dixième édition du *Systema naturae* (1758) est le point de depart de la nomenclature zoologique. L'année 1758 est donc la date à laquelle les zoologistes doivent demonter pour rechercher les noms génériques ou spécifiques les plus anciens, pourvu qu'ils soient conformes aux règles fondamentales de la nomenclature."

We see consequently *that the International Zoological Congress* repudiated the idea of going back for the generic names beyond 1758 and definitely and unequivocally *committed itself to the acceptance of each generic and each specific designation dating from 1758 and after, thus getting into complete accord with the provisions of the A. O. U. Code.* On this point, therefore, the French and the American zoologists were fully agreed.

Between the first and the second international zoological congresses (1889 and 1892) the Second International *Ornithological* Congress, meeting at Budapest, 1891, also took up the matter of zoological nomenclature, on the initiative of an "Entwurf von Regeln für die zoologische Nomenclatur," originating in Berlin and reported on by Dr. Anton Reichenow. Recognizing that the A. O. U. Code (1886) was "wohl der vollständigste und am schärfsten durchdachte Entwurf von Regeln für die zoologische Nomenclatur, welcher bis jetzt veröffentlicht worden ist," and noting that because of its "vorzüglichen Eigenschaften" most American zoologists had given it their approval, the German "Entwurf" proposed to adhere as closely to it as possible. Reichenow's proposal, with only a few verbal changes, was adopted by the International Ornithological Congress under the title "Regeln für die zoologische Nomenclatur" (Zweiter Internationaler Ornithologischer Congress, Budapest, 1891. Hauptbericht. I, Officieller Teil, pp. 183-190). The special part, which consists of 14 articles, contains the matter in which we are at present interested. Art. 5 reads as follows: "5. Die allgemeine Giltigkeit des Prioritätsgesetzes beginnt mit der X. Ausgabe von Linné's Systema Naturae (1758). Erläuterung: Das Jahr 1758 gilt als Anfangszeit des Prioritätsgesetzes ebensowohl für Gattungs- wie für Artnamen. Artnamen solcher Schriftsteller, welche nicht die binäre Nomenclatur im Princip angewendet haben, können nicht berücksichtigt werden, auch

wenn solche zufällig den Gesetzen der binären Nomenclatur entsprechen. Daher sind z. B. Brisson's Gattungsnamen anzunehmen, seine Artnamen aber sämmtlich zu verwerfen."

The only dissenting voice was that of Prof. Alfred Newton, of Cambridge, England, who in a vitriolic letter denounced the A. O. U. Code and upheld the Stricklandian Code as modified in 1865 by the committee of which he himself had been a member.

It is now worth repeating that in 1891 the A. O. U. Code; the Code of the Zoological Society of France; the International Zoological Code; and the International Ornithological Code (on German initiative), all had agreed to start from 1758 and to admit the genus denominations but not the species denominations of all subsequent authors even though they were not binominalists. Furthermore, while the British zoologists still adhered to 1766, they nevertheless made a special exception for generic names proposed by certain authors (Brisson, Artedi, Scopoli) *before* that date.

The German Zoological Society, founded in 1890, at its first annual meeting, Leipzig, 1891, entered the field of zoological nomenclature by electing a commission, consisting of Carus, Döderlein and Möbius, with the object of preparing a proposition for the "einheitliche Regelung der systematischen Nomenclatur." A preliminary discussion of the first draft took place at the second annual meeting in Berlin (1892).—Finally, at the third annual meeting in Göttingen, the final report, "Regeln für die wissenschaftliche Benennung der Thiere," edited by Bütschli, Carus, Döderlein, Ehlers, Ludwig, Möbius, Schulze, and Spengel, was adopted (Verh. Deutsch. Zool. Ges., Dritt. Jahresvers., Göttingen, 24 bis 26 Mai, 1893, pp. 89-98).

While this German code in many respects agrees with the American, French and International codes, it is diametrically opposed to them in that particular matter which we are discussing here. Article 7 is as follows: "Die Anwendung des Prioritätsgesetzes beginnt mit der zehnten Ausgabe von Linné's 'Systema Naturae' (1758). (a) Unzulässig sind Art-und Gattungsnamen aus solchen Druckschriften, in welchen die binäre Nomenclatur nicht principiell zur Anwendung kommt." As the previous German codes employ binär for binominal or binomial, the meaning of article 7 is unmistakable. According to it the generic names of Brisson, Gronovius, etc., even if published after 1758, are not available on the authority of their first proposers. Thus a new element of discord had entered the arena.

The third International Zoological Congress at Leiden, 1895, therefore elected a commission to study the question, consisting of Blanchard, Carus, Jentink, Sclater and Stiles, who met at Baden-

Baden August 5-7, 1897. The International [Paris-Moscow] Code was made the basis for the revision which was to be presented to the Congress at its coming meeting in Cambridge, England, in 1898. This revision, containing 61 articles in the French language edited by Blanchard (Bull. Soc. Zool. France, 1897, pp. 173-185), followed as closely as possible the sequence of the original [Paris-Moscow] International Code. Carus and Stiles were to present an official version in German and English, respectively, with the understanding that the French text was to be considered standard in case of doubt of interpretation. However, in presenting their individual reports side by side under one cover (Leipzig, Breitkopf and Härtel, 1898, 33 pp.) they changed the sequence and divided the articles in two sections under "A. Rules," and "B. Recommendations," the former again into 7 chapters, each subdivided into articles numbered from Art. 1 up.

The articles interesting us here are as follows:

Blanchard	Stiles	Carus
Art. 1	I. Art. 1	I. Art. 1
La nomenclature adoptée pour les animaux est binominale.	Zoological nomenclature is binominal.	Die zoologische Nomenclatur ist binominal.
Art. 33	VII. Art. 1	VII. Art. 1
Le nom attribué à chaque genre et à chaque espèce ne peut être que celui sous lequel ils ont été le plus anciennement désignés, à la condition: 2°. Que l'auteur ait effectivement entendu appliquer les règles de la nomenclature binaire.	The name of a genus or species can only be that name under which it was first designated, on the condition: b. That the author has properly applied the principles of binominal nomenclature.	Gültiger Name einer Gattung oder einer Art kann nur der Name sein, mit dem sie zuerst bezeichnet worden ist, unter der Bedingung, dasz. b. der Autor den Grundsätzen der binären Nomenclatur folgte.

Several points are to be noted here:

1. Blanchard's version is identical with that of the French Zoological Society and the International (Paris-Moscow) Code, leaving out, however, the word *"binaire"* in Art. 1, but retaining it in Art. 33.

2. Carus' German version of Art. 1 changes the word *binär* of the code of the German Zoological Society to *binomial,* but retains it in Art. 33.

It seems evident that Blanchard's dropping of *binaire* from Art. 1 and Carus' change of *binär* in the same article to *binomial* was due to a compromise, as the article is simply meant to establish the fact

that modern zoological nomenclature is *binominal,* one word for the generic designation and one word for the specific designation. *Binaire* in the French version being superfluous and *binär* in the German version being equivocal, the changes were made accordingly. Both, I suspect, agreed in this in a desire to prevent the official recognition of the trinominal as a category of equal nomenclatorial rank.

But it is certain that Blanchard by retaining the word *binaire* in Article 33 also retained the meaning it had in the former French editions. It is almost equally certain that Carus meant to retain the meaning of *binär* in the German code, viz., as synonymous with binominal.

It may not be out of place here to mention the effort of the British entomologists headed by Lord Walsingham and Sir George Hampson to place before the Zoological Congress at Cambridge some of their wishes with regard to a strict application of the law of priority in entomological work and related questions. They presented to the Congress a memorandum on the "Nomenclature of Lepidoptera" (68 pp.). The significant point is that they were unanimously in favor of 1758 as the starting point and they also unanimously agreed that the adoption of this date would make it unnecessary to make any exceptions in favor of earlier authors, such as had been made in the Stricklandian revised Code of 1865. It was thus made clear that even British zoologists were willing to accept 1758, if thereby they could retain all genera proposed after that date.

At the next (4th) International Zoological Congress at Cambridge, England, 1898, no steps could be taken to smooth away the many differences which had arisen. It was then decided to increase the membership of the Commission on Nomenclature to 15. This commission was instructed to centralize, discuss and elaborate all the questions relative to the zoological nomenclature and to present to the Congress in 1901 a final report on the question. The above mentioned memorandum of the British entomologists was also referred to the commission.

The reinforced commission met at the 5th Zoological Congress in Berlin, 1901. The members were perfectly clear on the point that they were expected to agree unequivocally on one definite proposition and that therefore the representatives of the three competing codes would have to yield on some of their pet contentions in order to obtain perfect agreement. It was realized that disagreement would spell calamity, and nobody wanted to take the responsibility of causing a schism. Nevertheless, a break was threatened several times, and concessions were made only after protracted discussion. The

International (Paris-Moscow) Code was made the basis of the revision and not the codification submitted by Carus (and conditionally adhered to by Stiles) to the Cambridge Congress.

Disagreements manifested themselves at the very first paragraph. It will be remembered that in the original code, the nomenclature was declared to be "*binaire* et *binominale*."

Dr. Stiles, who was the secretary of the Commission, and the present writer, who had had considerable to do with the framing of the A. O. U. Code (Science, vol. 7, Apr. 23, 1886, p. 374) considered themselves called upon to represent the viewpoint of the American zoologists. While admitting that the system of nomenclature was binary in the sense that generic and subgeneric designations are of a class by themselves and that the specific and subspecific designations belong to a second category,[1] they were not prepared to accept the modern nomenclature as binominal with the subspecifical denomination thrown in as a merely tolerated appendix such as contemplated in the French and German codes. Nor would a declaration that Zoological Nomenclature is binary and trinominal cover the ground. Their view being finally adopted, one of the German members, Dr. von Mährenthal, offered the following substitute:

"Die wissenschaftliche Bennennung der Tiere ist für das Subgenus und alle übergeordneten Kategorien mononominal, für die Species binominal, für die Subspecies trinominal" (the nomenclature of subgenera and higher groups is mononominal, of species binominal, of subspecies trinominal).

This version, which clearly established the modern zoological nomenclature as trinominal as against the former binominal method, being considered sufficiently explicit and embodying the idea of the A. O. U. canons vi and viii, was adopted unanimously (among those voting being Carus, Schulze, v. Mährenthal, Blanchard, Stiles, Stejneger, consequently representatives of all three codes).

The discussion of the Code then progressed article by article, until article 44 (Paris-Moscow Code; art. 33 Blanchard Rep. 1897; Chapt. vii, Art. 1, Stiles-Carus Rep.; art. 25 present Intern. Code), which was read:

"Le nom attribué à chaque genre et à chaque espèce ne peut être que celui sous lequel ils ont été le plus anciennement désignés, à la condition: *b*.—Que l'auteur ait effectivement entendu appliquer les règles de la nomenclature binaire."[2]

[1] The nomenclature of the A. O. U. Code is still binary in that sense, although trinominal.

[2] Remember that the other versions had practically accepted this identical wording, except Stiles', in which *binominal* was introduced in place of *binaire*.

I have previously shown (p. 11) that this phraseology in the Paris-Moscow Code meant to include the generic names of the *binary* but not *binominal* authors after 1758. Although realizing as a fact that the meaning in the revised edition was the same as in the original edition, nevertheless the present writer—agreeing as I did with the French view and insisting upon as close a conformity as possible with that of the A. O. U.—raised the question whether it would not be advisable to amend the phraseology so as to put the exact meaning beyond any possibility of misinterpretation, especially in view of the fact that the code of the German Zoological Society had a rule to the opposite effect. At this point I was interrupted by Carus, who had rendered the Blanchard (Paris-Moscow) version into German, with the remark that all doubt had been eliminated by the introduction of the new wording of article 1 (art. 2, new Intern. Code) to the effect that the scientific designation of animals is uninominal for subgenera and genera, etc. In this he was supported by F. E. Schulze and by v. Mährenthal, who was the author of the redrafted article 1. Accepting this as a definite abandonment of the German standpoint as against the united views of the French and American zoologists as well as the English entomologists (and to some extent the Stricklandian code of 1865), I did not insist on a rephrasing of the article, and as no motion had been made, no further formal record was entered. This, then, was the sacrifice made by the German delegation, meeting that made by the French with regard to the right to amend faultily constructed or erroneously spelled names. It should be further remembered that the French had already given in on the question of generic names before 1758. One of the principal objects of the French and American zoologists in adopting the edition of 1758 instead of that of 1766 was the inclusion of the Brissonian and other post-1758 genera without making a special rule of exception for their benefit (as the English had been obliged to do), exceptions to the rules being regarded as particularly obnoxious and to be avoided at any cost. It is my firm conviction that if the German zoologists at the meeting in Berlin had not conceded this point, the attempt to produce a generally accepted International Code would have failed as it had done at Leiden and at Cambridge. The result would have been three or four different codes: The French; the A. O. U. Code, backed by most American zoologists; the German Code, probably also accepted by the Austrian and Scandinavian zoologists; and the English adherents of the revised Stricklandian rules. It will be remembered how long the latter held out even after the new International Code had received the sanction of the rest of the world.

As it was, harmony had been achieved and a single code adopted by practically all zoologists. It is true that the American ornithologists have continued to follow their A. O. U. Code in their Check List of North American Birds, but the differences between the two codes are chiefly of a verbal nature with a somewhat different arrangement, so that in the introduction to the revised edition of the A. O. U. Code it could be truthfully stated (Code of Nomencl., Rev. Ed., 1908, p. xxiii):

"The latest and by far the most authoritative code, that of the Nomenclature Commission of the International Zoological Congress, issued in 1906, embodies all its [A. O. U.] principles and contains nothing antagonistic to them. A few additional points are covered, and others are treated in greater detail. Thus after the lapse of twenty years, the A. O. U. Code of Nomenclature became practically the official Code of an international association of zoologists."

Moreover, when article 30 of the International Zoological Code was amended in 1907, the A. O. U. canons 21-24 were likewise amended by the bodily acceptance of article 30, I. Z. C.

IV. BINARIANS AND BINOMINALISTS

Whether Tournefort's genera of 1700 are "something quite different" from Linnaeus' conception or not, and whether consequently the "glory" of having invented the "genus" in the sense in which it has been handed down from the great Swede to us belongs to him, may be regarded as immaterial in the present connection. It will be sufficient to repeat here that the Linnaean genus concept assumed definite shape in 1735 with Linnaeus' first edition of his Systema Naturae and was further elaborated and developed in the following editions. The species concept and species terminology, *as distinct from the genus terminology,* developed *pari passu* with the genus concept. In fact, with Linnaeus the *denomination* was at least of equal importance with the *differentiation.* It was to him the "filum Ariadneum" which led out of chaos; he proclaimed already in 1735: "Divisio & Denominatio fundamentum nostrae Scientiae sint."

The genus concept of Linnaeus was accepted and applied by practically everyone of his pupils and contemporaries after 1735. It was the identical concept which appears in Artedi's posthumous Ichthyologia, edited by Linnaeus himself in 1738. As a matter of fact, he had already incorporated the Artedian genera in his 1735 scheme: "In Ichthyologia nullam ipse elaboravi Methodum, verum suam nobiscum communicavit summus aevi nostri Ichthyologus, *Petr. Artedi, Suecus,* qui in distinguendis Piscium Generibus Naturalibus, &

Specierum differentiis parem sui non habuit." (I have elaborated no method of my own in the ichthyology, but Petr. Artedi, of Sweden, the greatest ichthyologist of our age, who had not his equal in distinguishing the natural genera and the differential characters of the species of fishes has left us his).

Among the pupils of Linnaeus I need only mention L. T. Gronovius, son of J. F. Gronovius, who sponsored the first edition of his Systema Naturae. The younger Gronovius in 1754 published the first and in 1756 the second volume of Museum Ichthyologicum to which was appended his Amphibiorum Historia. In this work the genera were quoted thus: SYNGNATHUS. Arted. Gen. 1, Linn. Gen. 148 (referring to the 6th edition of Linnaeus, Syst. Nat., 1748); then follows: the generic characters; the species designation (polynominal); the species synonymy; descriptive notes on the specimens and remarks; habitat; vernacular names. In the Amphibiorum Historia the treatment is similar and due reference made to each of the Linnaean genera, only here the quotation reads like this: "COLUBER Linn. syst p. 34, Gen. 89." He is consequently as thoroughgoing a binarian as Linnaeus himself.

That Brisson's genus concept did not differ from that of Linnaeus is too well known to need further demonstration. As for his application of it to mammals and birds, it is universally conceded that it was superior to that of Linnaeus himself (and the same may be truthfully said of the Gronovian genera of amphibians). Systematically and nomenclatorially there is no essential difference between the genera of Artedi, Gronovius, Brisson and Linnaeus himself before 1758. Nor did the year 1758 make any difference in this regard. They were all binarians after that date as they were before.

The species concept of these men was also essentially the same. Linnaeus, as we know, already in 1735 treated the species as a systematic unit as definitely separate from the genus as the latter from the order and the order from the class. The two categories he also distinguished nomenclatorially. For the genus he employed a single term consisting of one word; the species he distinguished by another term consisting of one or more words. His genera, in other words, were uninominal (or as others prefer to call them, mononomial); the species were to a great extent plurinominal (or polynomial). His was consequently at that time a nomenclature consisting of two terms, a nomenclature which unquestionably is binary. It certainly was not yet fully binominal. The great reform in the name applied to the species was not started on a grand scale until 1753, when Linnaeus substituted the *nomen triviale* for the previous plurinominal desig-

nation of the plant species (Species Plantarum). The animals continued for some time under the old binary plurinominal system, appearing thus in the ninth edition of Systema Naturae of 1756. It was only in 1757, in Hasselquist's Iter Palestinum, that Linnaeus consistently applied the binominal nomenclature to the animals, and in 1758, in the 10th edition of the Systema Naturae, the method is finally extended to all the species of animals then known to him.

The acceptance of the reform was general among his contemporaries. There were at least two notable exceptions, however. These were Brisson and Gronovius, both of whom retained their plurinominal species designations in their work published in the interval between the tenth (1758) and the twelfth (1766) editions of the Systema Naturae. As we have seen, the genera recognized by them and their designations differ in no essentials from those of Linnaeus, but while they consequently remained binarians they were not binominalists.

It has been said about Brisson that, as far as species names are concerned, he did not "play the game" of Linnaeus, that his nomenclature of the species is peculiarly his own, and that consequently it has no standing in a system of nomenclature bearing the name of Linnaeus. However, a comparative examination of the works of the two men does not bear out this contention.

To illustrate the socalled peculiarities of Brisson's system of nomenclature, I submit the following abbreviated list of species of birds (Ornithologie, 1760, vol. 3, pp. iii seqv.) of his Genus:

Passer (vol. 1, p. 36)

1. Passer domesticus
2. Passer montanus
29. Linaria
30. Linaria rubra major
31. Linaria rubra minor
36. Fringilla
37. Montifringilla
50. Serinus
51. Serinus italicus
52. Serinus canarius
54. Chloris, etc.

In all cases where Linnaeus includes the species in the sixth edition (1748) and the Fauna Suecica (1746) Brisson quotes the full reference to these works in every synonymy. When publishing his Orni-

thologie he did not see the 10th edition (1758) until after the 4th volume was printed.[1]

Compare the above list with the following list from Linnaeus' 6th edition (1748) and identically repeated in the 9th edition (1756) of the Systema Naturae:

Fringilla (6 ed., p. 30)

1. Fringilla
2. Fringilla crista flammea
3. Fringilla
4. Carduelis vulgaris
5. Carduelis lapponica
6. Carduelis lulensis
7. Montifringilla
8. Spinus
9. Canaria
10. Linaria major
11. Linaria minor
12. Passer domesticus

Noting that Linnaeus only enumerates species mentioned in his Fauna Suecica, 1746, while Brisson listed all the species known to him, and that Brisson regarded *Carduelis* as a distinct genus, while Linnaeus referred *Chloris* to the genus *Emberiza,* the similarity between Brisson's scheme of 1760 and Linnaeus' of 1748-1756 is so obvious that there is no need of further discussing the claim for originality and peculiarity made in behalf of Brisson's method. Nor is it necessary to repeat that just as Linnaeus was a zoological binarian in 1748-1766, so was Brisson still in 1760 and after. The difference between the two men is only that Brisson did not turn binominalist.

Gronovius, who as we have seen, was a binarian like Linnaeus himself in 1754 (Museum Ichthyologicum) and remained so in his Zoophylacium, published in 1763-1764, added a number of new genera of his own, but they are on the same plane and subject to the same rules. Whenever in his former work (1754) he gave his authority for the generic name, he gives no further reference in 1763, but when in the later work he introduces a genus not before treated of by himself he gives his authority thus: TARDIGRADUS. Brisson. Quadr. gen. 3., or CAPRA. Linn. Syst. Nat. Ed. 10. gen. 31. In enumerating the insects, he credits more than 40 generic names to the 10th edition of

[1] Allen, Bull. Amer. Mus. Nat. Hist. New York, vol. 28, 1910, p. 319.

Linnaeus. The specific names of Gronovius are typically plurinominals with no peculiarities calling for special comment in this connection.

The above may be summarized as follows:

Linnaean nomenclature before 1758 was binary.

Linnaean nomenclature in 1758 and after was binary and binominal.

Gronovian and Brissonian nomenclature was binary, but not binominal.

The genera of Linnaeus, Gronovius and Brisson were uninominal (mononomial).

The species of Linnaeus, until 1758, and of Gronovius and Brisson, until 1764, were plurinominal (polynomial).

The species of Linnaeus from 1758 were binominal.

The code of the American Ornithological union (1886) legalized the trinominal nomenclature and it may be emphasized that the International Code (1901) is likewise binary and trinominal.