On the Legality of Restriction of Type Locality

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The restriction of unknown, vague, or multiple type localities to more specific ones has for some years been a common practice among zoological systematists who have concerned themselves with monographic treatments of systematic groups or faunal units. In most instances efforts to determine more exactly the sources of many of the older types have involved investigations that have been as much historical as biological. Dunn (*1*) has suggested several criteria that might be employed in such procedure, and, in the main, type locality restriction based upon revisionary study and historical research has proved useful and generally acceptable. A recent paper by Smith and Taylor (*2*), however, restricting the type localities of some 400 species of reptiles and amphibians, many of which had not been subjected to such investigations, has led us to examine the problem of the legality of all type locality restriction.

The term "type locality" (or "type localities") is used and interpreted here in the usual fashion, i.e., the locality (or localities) where the type specimen (or specimens, syntypes, or cotypes) was actually collected. Usually, but not always, this is given with accuracy and clarity in the original description. In some cases, however, it has been given incorrectly or vaguely, and in such instances the recorded or published statement has no validity as against more precise information as to the actual provenance of the specimen (or specimens) in question. In our experience we have found this usage and interpretation invariable.

Under the general heading "Application of the law of priority" *The International Rules of Zoological Nomenclature* deals in Art. 29 with the division of a genus "into two or more restricted genera;" in Art. 30 with the designation of type species and genera; in Art. 31 with the division of a species "into two or more restricted species," which is "subject to the same rules as the division of a genus," and thus refers back to Art. 29. It might be expected that Art. 32 would deal with the designation of type specimens of species, and refer back to Art. 30, but this is not the case (Art. 32 deals with "rejection of names"), and there is no article on this subject in the *Rules* at all.

In a strict legal sense there are *no* rules or laws in this field; neither type specimens nor type localities are mentioned in the *International Rules*. Thus any and all procedure in this field is equally illegal, or extralegal, and no worker is legally bound by any prior action on the part of others.

If Arts. 29 and 31 are considered together, Art. 31 can be reworded to read: "If a species is divided into two or more restricted species, its valid name must be retained for one of the restricted species. If a type was originally established for said species, the specific name is retained for the restricted species containing said type." The provisions of Art. 31 practically direct that such a rewording be made, and this rewording introduces the term "type" on the species level.

In the absence from the rules of any parallel on the species level to Art. 30, it might be interesting and instructive to concoct one, and especially to create a parallel to Art. 30, Section g, which is the most relevant. Such an altered Section "g" follows.

> *g.* If an author, in publishing a species with more than one valid specimen, fails to designate or to indicate its type, any subsequent author may select the type, and such designation is not subject to change. The meaning of the expression "select the type" is to be rigidly construed. Mention of a specimen as an illustration or example of a species does not constitute selection of a type.

This rewording of Art. 30, Section g, provides a legal basis for the concept of "lectotypes," but this rewording is *not* in the *Rules*. It is not against the spirit of the *Rules* and is frequently in usage in ways varying from precise mention of a single specimen as lectotype, to a vaguer division of a set of syntypes (cotypes) into two or more lots. The procedures recommended by Schenck and McMasters (*3*) and by Simpson (*4*) both consider lectotypes of species as in the spirit of the *Rules* and as sanctioned by usage.

The parallel between the type of a species and the type of a genus is weak in that the first is a material object whereas the second is a concept. Simpson (*4*) expresses his objection to this situation, and we share his objection. It is, however, forced on us by Art. 31 of the *Rules,* and is valid in the sense that in both cases the "types" are the "name-bearers."

Neotypes of genera are not mentioned in the *Rules*. Neotypes of species (not mentioned in the *Rules*) are mentioned by both the articles on procedure noted above, but are not as yet considered legal, nor of common usage.

Type localities of species (not mentioned in the *Rules*) are alluded to in Opinion 52: "The citation of the type locality of a species is not sufficient to establish a name; . . . "the type locality becomes a part of the description and is to be considered an important element in determining the identity of the species."

Just as reexamination of a type specimen may bring to light errors in the original description or characters not mentioned in it, so reexamination of the data accompanying the type specimen or related to it (original labels, collector's notes, or itineraries, etc.) may add precision to or even alter the type locality as given in the original description.

The division of a species "into two or more restricted species" may automatically involve a concomitant selection or restriction of type localities as well as of type specimens—e.g., in the selection of lectotypes in the process of revisionary action. This sort of selection or restriction is not strictly legal (it is not mentioned in the *Rules*), but it is in the spirit of the rules and is sanctioned by usage.

No other selection or restriction of type localities seems to us called for, and no other such restrictions seem to us legally binding on other workers. We therefore regard the restrictions of Smith and Taylor as without legal status ("incompetent, irrelevant, immaterial") and do not consider them as binding on us or other workers.

References

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The Effect of Distillers' Solubles Containing Fluorine on the Development of Dental Enamel in Swine's Teeth [1, 2]

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This report is the result of a surprise finding of hypoplastic lesions in the enamel of the developing teeth of some swine that were being studied as "normal" animals. The experimental material upon which this investigation was based was obtained[1] in order to make supportive studies of normal development of the teeth and jaws for comparison with a large group of experimental swine. The discovery of developmental defects in well-bred swine that had been raised under ideal conditions pertinent to nutritional experimentation gave emphasis to the desire to find the cause for these lesions. Inasmuch as the animals were raised on a series of high-quality rations for the purpose of observing rate of growth and weight gains, it seemed doubtful that nutritional insufficiency (*1, 2*) would be a likely cause for the lesions. An examination of the rations fed (Table 1) will support this view. Also, since no sickness had been reported in the swine, it was not reasonable to believe that the lesions were the result of infectious processes. The most likely field for investigation seemed to be in relation to effects of some toxic substances that may inadvertently have got into the diet (*3, 4*). An examination of the diets, for the purpose of finding possible toxic substances, led to a consideration of distillers' solubles, which made up 10% of the diet of 5 animals. A discussion of these substances with our associate bacteriologist, J. L. Nemes, who has had personal experience in large distillery operations, led us to consider the possible presence of fluorine in the diets. It is the practice of many large distilleries to incorporate fluorine ($NH_4F \cdot HF$) into the mash during the brewing process in order to inhibit bacterial development (*5, 6*). Since the yeasts have been acclimatized to bifluoride during preparation, this does not interfere with fermentation. In subsequent distillation processes, the fluorine remains in the residue or "slops." These by-products of distillation frequently are used to supplement basal rations fed to livestock (*7, 8*).

The swine obtained for this study were from 26 to 29½ weeks old, 206–225 lbs in live weight, and were equally divided between the sexes. They were well-bred, as indicated in Fig. 1. Mandibles were disarticulated and split at the symphysis. Roentgenograms were made of both sides of each mandible. Primary sections were made for low-power microscopic study by cutting through the undecalcified mandibular teeth and bones by means of high-speed cutting disks, as previously described (*9*). These sections, 0.5–1.5 mm in thickness, were studied under reflected light through a research binocular microscope. There were 9 permanent first molar teeth included in the sections and 10 developing second molar teeth, all from the right half of the mandibles. Other histologic sections were made from decalcified, celloidin-embedded tissue, for high-power microscopic study. The celloidin sections included 5 developing second molar teeth.

Roentgenograms of the mandibles showed no changes in periosteal bone formation similar to those reported as resulting from fluorine intoxication (*10*). There were some irregularities in bone density, but this followed no characteristic pattern. The development of the teeth and jaws was as nearly equal among these swine as one would expect considering their variation in age.

The primary sections revealed developmental defects in enamel formation that ranged from a complete break in the contiguity of enamel in 2 second molar teeth (Nos. 278 and 7,675) to a mere thinning or gnarling of the enamel in a number of the others. A diagrammatic illustration of these changes is shown in Fig. 1. It was observed that only 1 first molar tooth (No. 7,823) contained a developmental fault. The characteristic region which seemed susceptible to developmental interference was an area about one third the distance from the occlusal surface, on the buccal aspect of the second molar teeth. Seven of the swine showed some irregularities in the architectural pattern of the enamel in this region, but animals 271, 278, and 7,675 were outstanding in this respect. Other irregularities were noted on the occlusal surfaces of 5 swine. A low-power picture of a developing second molar tooth with typical hypoplasia of the buccal and occlusal surfaces is shown in Fig. 2. A high-power photomicrograph of a hypoplastic lesion observed in the enamel of swine No. 271 is shown in Fig. 3. In this animal there was some enamel covering the dentin over all the tooth shown, but there was a definite fault over the buccal surface. Similar lesions were observed in

[1] Eleven swine heads were obtained from the Agricultural Research Center, Bureau of Animal Industries, USDA, Beltsville, Md. Ten of these were sectioned for study. We are indebted to John H. Zeller and N. R. Ellis, of the Bureau, for assistance in obtaining the swine tissue, feed samples, and the data on nutrition and swine characteristics of Table 1.

[2] Acknowledgment is made of the fluorine analysis of feeds done by the Food Division of the Food and Drug Administration.

[3] CDR, DC, USN. The opinions or assertions contained herein are those of the writer and are not to be construed as being official or as reflecting the views of the Department of the Navy or the naval service at large.