

Connecticut, U.S.A. The specific name *setiferus* L., 1767, thus is the oldest available name for the northern species, the name *fluviatilis* Say, 1817, falling as a junior synonym. The locality off Matanzas Inlet, Florida, thus becomes the restricted type locality for the species. This locality falls within the original type locality "America". If Linnaeus' (1767) locality indication "*in Indiis*" is not considered an error for "America" but a restriction of the type locality meaning either both the East and West Indies or only the West Indies (which in my opinion would be far fetched), then still Burkenroad's type locality restriction to Florida is valid, as the term West Indies formerly was generally employed not only for the Antillean Islands but also for a large part of the American mainland. So in the (1914-1917) Dutch "Encyclopaedie van Nederlansch West-Indië" (:742) it says that "for many years after the discovery of the new world the name West Indies was used for the continent of America as well as for the group of islands situated between 10° and 28° N" (translation by the present author). Until this day in Dutch the word "West Indië" is used to indicate both the Netherlands Antilles and Suriname. Also in A. Vazquez de Espinosa's "Compendium and Description of the West Indies" (1942, Smithsonian, misc. Coll. 102) Florida is one of the first areas to be dealt with (:106). Therefore I cannot find any valid argument to contest the correctness of Burkenroad's (1939) action to restrict the specific name *setiferus* to the Northern White Shrimp.

My second point concerns the question whether or not it is in the interest of nomenclatural stability and uniformity to have the name *P. setiferus* restricted to the northern species. As shown by Gunter, in the literature both the northern and the southern species were rather sporadically dealt with in taxonomic, and practically not at all in non-taxonomic papers. However, in the course of the 19th century the northern species became the subject of important fisheries, especially in the South Atlantic and Gulf States of the United States. According to Johnson & Lindner (1934, Invest. Rep. U. S. Bur. Fish. 21:3, 4) the annual catch of shrimp in that area fluctuated between 7 and 20 million pounds in the period between 1889 and 1908, but soon rose to become around 100 million pounds a year between 1927 and 1931; it was 150 million pounds in 1943 (cf. Fishery Resources of the United States, 1945, 79th Congress 1st session, Senate Doc. 51:91). Of this catch 95% consisted of *Penaeus setiferus* (L.). Around 1934, the economic importance of the southern species was negligible, being only of some local interest in Brazil (cf. Johnson & Lindner, 1934:68). Therefore practically all the non-taxonomic and most of the taxonomic literature dealing with "*Penaeus setiferus*" before 1936, actually treated the northern species. When Burkenroad in 1936 discovered the specific distinctness of the northern and southern species, his action to leave the name *setiferus* with the northern species was, from a viewpoint of nomenclatural stability and uniformity, a very laudable one. In this way the name *setiferus* was kept for the well known economically very important species about which there existed an extensive literature in which it was always indicated under the name *P. setiferus*, while the new name *P. schmitti* was given to the poorly known southern species, which at that time had hardly any economic importance and about which there was hardly any literature. In recent years the interest in shrimp fisheries in Latin America is greatly increasing and with better fishing facilities it has become possible there to fish more intensively and also to fish in formerly unexploited areas. In the fishery literature on the Southern

White Shrimp, which is rapidly building up, the species is consistently indicated with the name *Penaeus schmitti*. Summarizing, we can say that before the discovery in 1936 of the fact that there are two species of East American White Shrimp, practically all non-taxonomic and the greater part of the taxonomic literature concerned the northern form, which (like the southern) was uniformly indicated as *Penaeus setiferus*. When the literature on the southern form increased due to the increasing economic importance of the species, the name *P. schmitti* had already been introduced for it and at present the species is indicated in all literature with that name.

Concluding I may remark that the well-established current use of the name *Penaeus setiferus* (L.) for the Northern White Shrimp and that of *Penaeus schmitti* Burkenroad for the Southern White Shrimp, according to the International Code of Zoological Nomenclature is the legal nomenclature for these species. Any change in these names therefore would not only upset the uniformity and stability of the nomenclature of these two species, but would at the same time be contrary to a strict application of the Code.



REPLY TO DR. L. B. HOLTHUIS ON THE
NAMES OF WHITE SHRIMP

by

Gordon Gunter

(As an explanation to the reader it should be stated that my paper was submitted to Doctor Holthuis for *Crustaceana*. He asked me to withdraw it and I did so saying that I would publish it elsewhere. He then asked me to publish his remarks along with it, to which I agreed, and they are given above. However, his interpretations and ideas in this instance are contrary to the International Code of Zoological Nomenclature. Therefore, I have prepared the following rebuttal.)

Doctor Holthuis' remarks can be answered in the same way that they are stated, in generalities and in specific detail. His expressed devotion to nomenclatural stability is no less than my own and we differ only in the approach to the attainment of stability. In fact, Doctor Holthuis' aims would be better served if he would apply the Rules regarding generic names of penaeid shrimp (Gunter, 1957) and not set up *Penaeus*, erroneously, as the root word for all genera (Holthuis, 1959).

We are now only in the second hundred years since the establishment of zoological taxonomy and yet many zoologists, including taxonomists, are impatient to have stability of nomenclature attained within their lifetime, which is clearly impossible if for no other reason than the fact that there are too few specialists, and many groups go for years without being worked on. Zoologists will do well to have things fairly stable within the third century of formal systematics.

In Doctor Holthuis' remarks there is the implication that things have stood as they are for many, many years and thus should not now be disturbed. This is incorrect. When I started work on shrimp thirty-two years ago, there were only two species of *Penaeus* recognized on the whole eastern coast of the Western Hemisphere. Today, five species are recognized and there has been a vast overturn in usage, due to the works of Burkenroad, some of which lead to dismay among the older carcinologists. The case in question here is only twenty-six years old, and it stems from the time Burkenroad described the South American white shrimp as new. The period is short in terms of zoological nomenclature.

Doctor Holthuis has stated that Burkenroad's designation of the Matanzas, Florida specimen as the neotype of the *Penaeus setiferus* is valid. Yet he wishes to establish Seba's figure as the lectotype. This is unnecessary, if not contradictory. If the neotype is valid, a lectotype is not needed. Additionally, his lectotype designation is invalid for three reasons. First, it is contrary to the "Recommendation" that lectotype selection shall have as its object the definition of the species. The two species in question are well defined, and Seba's figure will not help "define" the species. Such a lectotype would not serve his purpose anyway since he cannot show it derived from North America. It is invalid for the same reason. As I have shown above and additionally below, the documented evidence indicates that Seba's specimen was South American.

Doctor Holthuis' learned discussion of Seba's figure is correct of course, but it is not pertinent to the case, except to indicate that the figure would be a singularly unfortunate lectotype for the purpose of "clarifying" the species. The Code clearly states that a zoologist designating a lectotype should publish "at least" the data listed under Recommendation 73C, listed under 10 categories, only 8 of which apply to a non-fossil marine species. Doctor Holthuis can supply none of these except that the specimen was, presumably, adult. For this reason, too, his lectotype is very poor and probably is invalid. It would be best to let that matter lie and retain Linnaeus' name by common assent, as has been done.

Seba's figure has been accepted as the original of *Cancer setiferus* by general accord of earlier workers and the same general accord indicates that it was South American. There is little to be gained now by designating this figure, known to be erroneous in some ways, as the lectotype. In fact, Doctor Holthuis' aim is to set up a northern locality for this lectotype, and that cannot be done without going in the face of all evidence.

Doctor Holthuis' inclusion of lower Florida in the Indies involves an idea so old that it has been forgotten. But even so, his argument is invalid due to the known distribution of the white shrimp. These do not exist in the Keys nor on the West Florida coast along the shores of the peninsula. They are present only in very small and scattered concentrations as far south as the St. Lucie inlet, on the east coast, where I have taken them in recent years (Gunter, 1959). This is south of the previously known southernmost Florida records at Cape Canaveral, which is north of 28° N., the northern Florida limit for the Indies. It should be pointed out that Matanzas Inlet is in north Florida, within 50 miles of the Georgia line, much farther north of 28° N. It is hardly possible that Seba obtained white shrimp from the southern part of Florida, because the area does not lie within the range of either species.

In suggesting that Seba's specimen may have come from some other part of the South Atlantic coast of the present United States, Doctor Holthuis has overlooked a matter of American history. The American Colonies were required to trade with the mother country, and mostly, if not altogether, in ships of British registry. Such ships did not generally travel from the American Colonies to the Dutch ports. These trade restrictions were the basis for one of the complaints that led to the American Revolution a few years later. Except for very rare strays, white shrimp do not extend north of Cape Hatteras, North Carolina, and Seba's Virginia connections would hardly have yielded him any white shrimp. The Virginia, New Jersey and New York records of white shrimp are comparable to the rare examples of tropical marine fishes sometimes reported from southern Canadian waters. The whole idea of North American origin of Seba's specimen is far-fetched and highly improbable.

The Rules, or Code as they are now called, were devised to bring about order and justice in the naming of species by biologists and their application must be determined on these grounds. If it were left to laymen, the whole system of Latin specific names would probably be abolished. Therefore, I am making no attempt to answer Doctor Holthuis' remarks on that score because their bearing on the question is indirect at best.

Doctor Holthuis has avoided completely the question of the rights of Thomas Say in this matter and the related one concerning what obligations later workers have to him in this connection.

Burkenroad's designation of the neotype of *Penaeus setiferus* is invalid for four reasons. The neotype was not selected to resolve a complex zoological circumstance. The distinction of the two species of American white shrimp has never been questioned. The differences are clear and their distribution is disjunctive. No zoological questions are involved, only taxonomic ones. The neotype is further invalid because there is considerable positive evidence, and none to the contrary, that it is outside of the range of the species traditionally referred to as *Penaeus setiferus*. Furthermore, the only "exceptional circumstance" was Burkenroad's somewhat lame defense of *Penaeus setiferus* as the name of the North American white shrimp after erroneously giving the South American species a new name, which error he recognized apparently sometime between 1936 and 1939 (see literature cited above). Therefore he did not designate the neotype at the time he "revised" the species, which must be done, according to the Code. The Code indicates clearly that neotypes are not necessary for either one of the two species under discussion and would be quite difficult, if not impossible, to validate before the Commission. This would do grave injustice to Thomas Say.

Gmelin (1790), Olivier (1811), H. Milne Edwards (1837), de Saussure, *auct.* (1858), Heller (1865), Bate (1881), and Rathbun (1897 and 1900) all used *setiferus* as the specific name for the South American white shrimp. If we were to doubt all earlier writers and their clear designations of South America for other species of organisms, taxonomy would be thrown into a terrible state of confusion. The statements of the workers on the name and distribution of *P. setiferus* are positive evidence, and there is no positive evidence to the contrary. Doctor Holthuis refers pejoratively to the few older records of white shrimp as sporadic, but the fact that there have been few workers with the Crustacea does not justify

ignoring the work that was done. When Rathbun (1896) gave a new name to the common blue crab of the western Atlantic she cited all previous scientific literature and came up with only four previous references.

The men closest to Linnaeus in time, and who possibly had information which we do not know about, referred to the South American white shrimp as *setiferus*, and these are the only positive references in the literature.

The older workers knew how to write and say North America, but nobody had ever mentioned a North American white shrimp (or a penaeid) until Thomas Say described the species, and his description and name is valid. Attempts to avoid this simple and straightforward conclusion serve no good purpose taxonomically or otherwise. Such usage is in the interest of correct and stable zoological nomenclature. According to the Code, the proper name of the South American white shrimp is *Penaeus setiferus* (Linnaeus) and the proper name of the North American white shrimp is *Penaeus fluvialis* Say.

ADDITIONAL REFERENCES

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STUDIES ON THE LARVAL DEVELOPMENT OF
RITHROpanopeus harrisi (GOULD)
OF THE FAMILY XANTHIDAE (BRACHYURA)

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INTRODUCTION

Because the early biologists did not see decapod larvae "in the act" of changing from one phase to another due to the fact that they were parts of planktonic collections and their parentage was unknown, each phase was given a generic and specific name of its own. Gurney (1924) did not concur with this practice, but was of the opinion that it is more profitable to assign larvae to definite genera or families, even if the reference proved to be wrong.

The chief difficulty encountered in rearing decapod larvae is the maintenance of a constant supply of suitable living food (Needham, 1959). The early embryonic studies of brachyuran crustaceans did not reveal complete life histories. This was due primarily to the lack of effective culture techniques. Birge (1883) gave no details of his culture methods in the study of the development of *Panopeus sayi* (Smith). Hyman (1925) gave no account of an attempt to culture larvae of xanthid crabs. In recent years the use of definite diets for the larvae has resulted in a knowledge of complete life histories. Knudsen (1959) used *Artemia* nauplii in feeding larvae of four xanthid crabs of the California coast. Chamberlain (1961) used various combinations of *Artemia* nauplii and two species of algae to feed larvae of three xanthid crabs of the North Carolina coast. His best results were with a diet of *Artemia* alone.

Former studies of brachyuran embryology at the Gulf Coast Research Laboratory were confined to the description of larvae taken in planktonic collections at or near the surface. Advanced larval forms are not found in such collections. It seldom happens that in planktonic material a series of stages of the same larvae is taken which is sufficiently complete to enable the genus to be determined. The remainder must be identified as nearly as possible by reference to published descriptions of larvae whose parentage is known, and such identification must in many cases be very speculative.

Hyman (1925) described a prezoal, four zoal and a megalops stage of *Neopanope texana sayi* (Smith) at Beaufort, North Carolina. Also in his studies is a description of a prezoal and the first zoal stage of *Eurypanopeus depressus* (Smith). Knudsen (1958, 1959, 1960) described culture methods and four zoal stages and a megalops stage of four species of xanthid crabs from California. Prezoae were described for two of these species. Chamberlain (1961) described culture methods and four zoal stages and a megalops of *Neopanope texana sayi* (Smith) at Duke University Marine Laboratory, Beaufort, North Carolina.