NOTE ON THE AGE OF THE CHIPOLA FORMATION (MIOCENE) OF NORTHWESTERN FLORIDA

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ABSTRACT

In recent years the Chipola Formation of northwestern Florida has been generally accepted as uppermost lower Miocene (Burdigalian) in age. However in the Chipola five species of Muricinae (Mollusca: Gastropoda) first appear which are most closely related to species described from the Helvetian of western Europe. Therefore the question is raised as to whether a younger age assignment for the Chipola and its correlatives is in order.

The philosophical aspects of correlation between the New World and the standard section of the European and Mediterranean area are well covered by Eames, *et al.* (1962). A portion of their discussion is worth quoting here in justification of any endeavor to improve the status of our New World correlation.

> "All stages of the Tertiary have their type localities within the region comprised by west and central Europe and the Mediterranean area, and these stages constitute the acknowledged, basic, fundamental standard of classification. These must remain the standard; all age determinations from other areas must be considered in direct relation to them, and are always open to reconsideration." (Eames, *et al.*, 1962, p. 2-3).

In the course of work on the species of Muricinae (Mollusca: Gastropoda), and especially of the genus *Chicoreus*, the writer has become dubious of the Burdigalian age assignment for the Chipola Formation of northwestern Florida.

The Chipola Formation was first described, although not named, by Langdon (1889), who measured the section at Alum Bluff, on the Apalachicola River in northwestern Florida. He cited 35 feet of "light yellow sand, containing pockets of fossils" at the base of the bluff (p. 322). After Langdon called attention to this section Mr. Frank Burns of the U. S. Geological Survey visited Alum Bluff, measured the section, and made a large collection of fossils. Burns also discovered that the fossiliferous beds which occurred at the base of Alum Bluff were exposed along the Chipola River[1] to the west of the Apalachicola. Here the fossils are in a much better state of preservation and, upon Burns' suggestion, Dall in 1892 proposed the name "Chipola marl" for these beds. At the same time Dall also proposed the name "Alum Bluff beds" for the non-fossiliferous sands and clays which overlay the Chipola Marl at Alum Bluff and underlay the fossiliferous upper strata (now Choctawhatchee Formation). The previous year (not seen: 1891, *fide* Wilmarth) Langdon had applied the name "Alum Bluff series" to the entire Miocene section at Alum Bluff, including both the upper and the lower fossiliferous horizons in his unit. Cooke and Mossom (1929, p. 138) stated that the "Alum Bluff series" of Langdon included only the Choctawhatchee horizon and that "Dall's 'Alum Bluff beds' and 'Chipola marl,' described in 1892, were under water at the time of Langdon's visit and were not discovered until December, 1889." A com-

[1] "Bailey's Ferry," a classic locality in the geological literature was located at the mouth of Ten Mile Creek where a hard bed of the Tampa Limestone, which underlies the Chipola, is exposed just at river level. Here it was possible to drive a wagon down to the river without sinking up to the axles in Chipola mud. The cuts for the ferry approach are still visible, although overgrown.

parison of the measured sections of Langdon, Burns, and later writers reveals that the entire section was given by Langdon, with the possible exception of the lowest portion of the basal bed, and that his "Alum Bluff series" did include those beds at the bluff which today are referred to the "Alum Bluff Group." (See also Vernon's discussion, 1942, p. 73.) Nevertheless Langdon's "Alum Bluff series" was never recognized and it was the "Alum Bluff beds" of Dall which Matson and Clapp (1909) raised to the rank of a formation with the Chipola Marl as a member. In 1926 Gardner gave the Alum Bluff the status of a group, with the Chipola as the basal formation.

The first age assignment made for the Chipola beds was "Miocene," to which age Langdon referred the entire Alum Bluff section. In 1892 Dall applied the term "Older Miocene" to all of the pre-Chesapeake Miocene (*i.e.,* pre-Choctawhatchee in Florida), including the Chipola Marl and the "Alum Bluff beds" in a "Tampa Group" which he proposed at the same time. Shortly thereafter, Dall (1896, p. 304) referred all of his "Older Miocene" strata of Florida and the Antilles to the upper Oligocene or Aquitanian, stating that "no strictly Miocene strata have yet been discriminated in the Antillean region," and "the strata of true Miocene in Florida are known to be extremely thin." (1896, p. 303-304). This age assignment was accepted until 1916, when Sellards proposed that the Alum Bluff beds should again be referred to the Miocene on the basis of certain vertebrate fossils, especially the protohippine horse *Merychippus.* Sellards judged the beds to be of lower middle Miocene age. (The beds in which Sellard's fossils were found are now referred to the Hawthorne Formation, usually considered as of lower and middle Miocene age. The Chipola may or may not be correlated with this part of the Hawthorne.) In 1919 Vaughan (p. 220) pushed the Alum Bluff Formation back down to the lower Miocene on the opinion of Prof. J. C. Merriam, who considered *Merychippus* "as the lower Miocene (Burdigalian) age." In 1926 Gardner began her series of studies on the molluscan fauna of the Alum Bluff Group and in the introduction she stated that "the detailed discussion of the stratigraphy will follow the systematic treatment of the fauna." (1926, p. 1). However it never appeared, and nowhere in the nine parts published over the next 25 years was there ever an age assignment given for any of the formations. Meanwhile, Woodring (1928, p. 90) followed Vaughan and gave the Chipola Formation an upper lower Miocene age, correlating it with the Quebradillas Limestone, and the Tuxpan, Thomonde, and Baitoa Formations of the Caribbean area. It is this correlation which has become the accepted standard for the western Atlantic region, and it was thus that it appeared in the Geological Society of America correlation chart (Cooke, *et al.,* 1943). In this chart it was noted that "Correlation with European stages is merely suggested. Exact correlation is not justified by the information at hand." (p. 1714). However a tentative Burdigalian assignment was made for the Chipola Formation.

There are four species of *Chicoreus* in the Chipola; *C. cornurectus* (Guppy), *C. folidodes* (Gardner), *C. lepidotus* (E. H. Vokes) and *C. dujardinoides* (E. H. Vokes). The two latter species are little more than stratigraphic subspecies (as, in fact, they were originally described) with *C. lepidotus* occurring in the lower beds of the Chipola, and *C. dujardinoides* in the upper beds. These two species are very close to the European Helvetian species, *C. bourgeoisi* (Tournouër) and *C. dujardini* (Tournouër) respectively. *C. folidodes* is also closely related to a species from the Helvetian of Euope, *C. aquitanicus* (Grateloup). Although Cossmann and Peyrot (1923, p. 122) considered *C. aquitanicus* as confined to the Tortonian, Glibert has reported this species from the Helvetian of Belgium (1952a, p. 90) and France (1952b, p. 290), and it is obvious from his illustrations that the Helvetian and Tortonian forms are the same. Specimens of *C. aquitanicus, C. dujardini,* and *C. bourgeoisi* are figured in the *Chicoreus* monograph preceding for comparison with their western Atlantic counterparts (plate I, figs. 2, 3, 5). The fourth species of *Chicoreus* in the Chipola, *C. cornurectus,* a common species in the Miocene of the Caribbean, especially Santo Domingo, also resembles *C. dujardini* and is presumably a close relative of that species.

One other muricine species in the Chipola, *Murex (Bolinus) vaughani* Maury, is also closely related to a European species, *Murex torularius* Lamarck, from the Helvetian and subsequent beds of the Mediter-

ranean area (see Vokes, 1963, p. 151). Thus we find in the Chipola five species of Muricinae that have no known American antecedents and which are much like species occurring in the Helvetian of western Europe.[2] The mechanism by which these European muricine species made their way to the New World is not known, nor why it should be that no more than these did make it. At this time no modern gastropod larvae are known to remain pelagic for a sufficient time to drift across the Atlantic Ocean. However, Thorson (1961) has suggested that among the truly "long-distance" larvae are those of the warm water, shallow dwelling, marine prosobranch gastropods, which would include the genus *Chicoreus*. Only a slight increase in current speed would permit the survival of these larvae for sufficient time to cross the Atlantic from West Africa to the Antilles. Today along the northwest coast of Africa we find at least three species of *Chicoreus* with four varices per whorl, a condition unique to this area. These, no doubt, are the descendants of the Miocene *C. bourgeoisi*. In fact authors (*e.g.* Nicklés, 1950) have used the name *C. bourgeoisi* for a Recent species, although the two forms are distinct. It is also along the West Coast of Africa that *Murex cornutus* Linnaeus occurs, a descendant of *Murex torularius*. Presumably the western extension of Africa played an important role in the migration route.

The fact remains that however they got across the Atlantic the presence of these species of European affinities in the Chipola fauna cannot be denied. This writer is of the opinion that five species from one subfamily alone are too many to be explained by any sort of parallel development. Their "sudden" appearance is most easily explained by migration from the eastern Atlantic and their similarity to the European species suggests that this migration occurred during Helvetian time. The evidence presented here is not conclusive but it does suggest that an upward shift in the relative position of the Chipola to conform to the European Miocene sequence may be indicated.

[2] There is also in the Chipola an undescribed species which most closely resembles *Typhis tripterus* Grateloup from the Helvetian of France and Hungary. This latter species has been referred to the subgenus *Nothotyphis* by Fleming (1962, Trans. Roy. Soc. New Zealand, v. 2, no. 14, p. 117). There is some question in my mind whether the group is to be considered as a subgenus of *Typhis* or of *Pterynotus* where it was placed by Fleming. Nevertheless this is one more link in the chain of evidence for a Helvetian age assignment for the Chipola.

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