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# CATALOGUE AND NOTES ON THE GASTROPOD GENUS BUSYCON*

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## INTRODUCTION

The busycons or "whelks" have long attracted the interest of American workers because of their ponderous size and abundance in the eastern American Cenozoic faunas. The first attempt to monograph the group was by Conrad in 1854. A number of other workers have undertaken phylogenetic and taxonomic studies of the genus. Prominent among these are Gill (1867), Conrad (1867), Dall (1890), B. Smith (1902; 1914), Grabau (1903; 1907), Wade (1917), and Gardner (1944; 1948). Though considerable data have appeared in the literature, no comprehensive catalogue of the genus has been compiled in nearly one hundred years. The primary purpose of this paper is to enumerate the several supraspecific and the numerous specific-infraspecific names which have been referred to the genus *Busycon* (*sensu lato*). It is hoped that this catalogue will be of some aid in the interpretation of the rather complex nomenclatural history which confronts students of the group.

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## GENERAL NOTES PERTAINING TO THE GENUS

Geologic History.—The group is confined in its fossil and natural Recent distribution to the Western Atlantic coast. A major controlling factor in the limited distribution of the genus may be the lack of an active

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free-swimming larval stage which is explained by the loss of the velum before the animal emerges from the egg-capsule.

Available data would indicate that the ancestral stock probably originated in the Cretaceous of eastern America as small, thin-shelled species. Though the early Tertiary record is uncertain, by mid-Miocene time the group had gradually evolved into many large, heavy-shelled species. Having attained an apparent acme in the Miocene of the middle Atlantic states, the genus declined in number of species in the Pliocene and is represented in the Quaternary by a few, but very conspicuous species.

The presence of the non-canaliculate species, *Busycon spiniger* (Conrad, 1848) in the Red Bluff formation (Lower Oligocene) of Mississippi and *B. nodulatum* (Conrad, 1849) in the Vicksburg group (Middle Oligocene), indicates that *Busycon* (*sensu stricto*) was well defined by the beginning of the Oligocene. By mid-Miocene time the *Sycotypus* [=*Busycotypus*] line of descent, in which the whorls became separated by a deep canaliculate suture, had become established. This morphologic character remains fixed in the species comprising this branch of development, with only an occasional reversion to a weakly developed sutural canal.

Wade (1917:293) commented that our knowledge of the pre-Oligocene history of the busycons "seems to be in a chaotic state"; unfortunately this situation remains essentially unaltered at this date. Grabau (1903) questioned the existence of the genus in the Eocene. However, Dall (1890:109) believed that the group had assumed its characteristic shell features before the close of the Eocene and that the genus first appeared in that epoch. Both Dall (1890:117) and Harris (1895:70) were of the opinion that the busycons originated from the *Levifusus*-complex. Maury (1909:335) described *Levifusus fulguriparens* from the Jackson formation (Upper Eocene) of Louisiana and considered it to link *Levifusus* with *Busycon spiniger* (Conrad, 1848), which is known to occur in the Red Bluff clay (Lower Oligocene) of Mississippi. The species included in *Levifusus sensu stricto*, especially the genotype from the Midway (Paleocene), the Wilcox (Eocene), and the Claiborne (Eocene), resemble in general form a small busycon, but, unlike the "true" busycons, possess a second angulation on the body whorl; in the Busyconinae the protoconch appears to be the primary indicator of natural relationships (cf. B. Smith, 1945:14). It seems probable that the general morphologic features common to *Levifusus* and *Busycon* may be due to convergence rather than to a close relationship. Inasmuch as the genus is well defined by early Oligocene time, the scarcity of early Tertiary data pertaining to the group is a perplexing problem.

The discovery by Wade (1917) of a busycon-like gastropod in the Ripley formation (Upper Cretaceous) of Tennessee further complicated the interpretation of the early history of the group. He proposed, with *Busycon cretaceum* as the type species, the subgenus *Protobusycon*, differentiating it from *Busycon sensu stricto* by the possession of a shallow sulcus at the base of the body whorl. Unfortunately, the proto-

conch of the unique specimen upon which the subgenus is based was not preserved. Wade (1917:296) believed that *B. cretaceum* could be favorably compared in gross morphologic aspects with *B. carica* (Gmelin, 1790), the type species of *Busycon*, but noted that a basal sulcus is not developed in any of the Cenozoic representatives of the genus. Stephenson (1941:324) recorded a large gastropod similar to *B. cretaceum* Wade from the Nacatoch sand of the Navarro group (Upper Cretaceous) of Texas. Though Stephenson's material was based on incomplete internal and external molds, there is no indication of a spiral sulcus at the base of the body whorl. He postulated that the presence of the basal sulcus in Wade's lone specimen may be a pathologic feature caused possibly by an injury to the mantle.

Harris (1896:96) described *"Fulgur? dallianum"* from the Midway formation (Paleocene) of Alabama on the basis of a single fragment. This record, together with specimens of the apical portions of a gastropod recorded by Gardner (1933:226) from the Midway of Texas may possibly represent species referable to the subgenus *Protobusycon*. However, these Paleocene records are based upon such meager and poorly preserved material that they cannot be definitely allocated to *Protobusycon*. Until additional specimens of *B. cretaceum* and its allies are obtained, it seems advisable to place *Protobusycon* in the category *"incerta sedis."* Following Wade (1917) and Wenz (1943) the authors have questionably referred *Protobusycon* to *Busycon sensu lato*.

*Ecologic considerations.*—Though a number of short papers on the natural history of these gastropods have appeared, the recent contribution of Magalhaes (1948) is the most valuable single source for neoecological data and includes a lengthy bibliography.

The busycons are most commonly reported from the intertidal zone. There is a surprising paucity of bathymetric records for these gastropods. The available data would indicate the maximum offshore habitat to be in the eulittoral zone (0-50 meters) of the benthic system. Although *B. spiratum* (Lamarck, 1816) is recorded from 50 fathoms (Dall, 1903), the occurence of the genus in the sublittoral zone (outer neritic) would appear to be rare.

Being carnivorous, these conchs may be expected to frequent a variety of bottom types. Though the busycons are recorded from substrates ranging from rock and shell to sand and mud bottoms, they appear to be found most commonly on the finer clastic sediments in which pelecypods, one of their main sources of food, are abundant.

*Distribution.*—In its Recent distribution, the genus *Busycon* is known to range southward along the coastline from Cape Cod, Massachusetts to the Gulf of Campeche, Mexico, it is also known to occur in some of the northerly islands of the West Indies. It should be noted at this time that *Busycon canaliculatus* (Linné, 1758) has been introduced[3] inadvertedly to San Francisco Bay, California (Calif. Acad. Sci. Dept. Geol. loc. no. 29077) probably by the activities of man through the importation of Atlantic oysters and oyster spat.

[3]Hertlein, L. G. (personal communication)

## REVIEW OF CLASSIFICATION

### Subfamily BUSYCONINAE[4]

### Genus Busycon 'BOLTEN' RÖDING, 1798

*Busycon* 'BOLTEN' RÖDING, 1798, Museum Boltenianum, pt. 2, p. 149; *Busycum* "BOLT[EN]" MÖRCH, 1852, Cat. Conch. Yoldi, vol. 1, p. 104; *Busicon* "CON[RAD]" EMMONS, 1858, Rept. North Carolina Geol. Surv., p. 248.

TYPE SPECIES: *Murex carica* GMELIN, 1790 = *Busycon carica* (GMELIN, 1790) [by subsequent designation, B. SMITH, 1938:20].

GEOLOGIC RANGE: [?Upper Cretaceous] Oligocene to Recent.

DIAGNOSTIC CHARACTERS: Shell large or medium sized, pyriform, thin to heavy; spire short, terminating in a paucispiral, papillate nucleus; body whorl large, inflated; collumella long, slender with a single, somewhat obsolete fold; spiral sculpture usually developed; axial sculpture expressed by growth lines and resting stages, often tuberculate or spinose upon the periphery of the whorls; anterior canal long, open, somewhat recurved; posterior canal lacking; outer lip smooth or lirate; operculum ovate, with apical nucleus; periostracum, thin, simple, or hirsuted.

REMARKS: B. SMITH (1938) has made a critical and apparently exhaustive study of the involved type designation for this genus. He concludes that none of the previous designations are valid, selecting *Busycon carica* (GMELIN, 1790) as the type species. Although this designation appears to be valid, the designation of *Busycon muricatum* 'BOLTEN' RÖDING, 1798 [= *Murex carica* GMELIN, 1790] as the type species would have been in strict adherence to the Règles.

Post-Eocene species of the genus may be conveniently assigned to either *Busycon s. s.* or to *Busycotypus* depending upon the suture type. The development of a canaliculate suture appears to be a morphologic feature in the *Busycotypus*-complex representing a natural line of descent. Phylogenetic studies of the genus indicate the presence of several apparently definable bio-temporal species groups within the two major evolutionary branches of the genus. At this time, it seems advisable to regard the subgeneric names, which have thus far been proposed for these species groups, as "Sections", and thus retain the generally accepted two-fold classification of the genus. Otherwise it would be necessary to raise the presently recognized subgenera to full generic status and in turn name and treat the several species groups as sub-generic units. The erection of formal names for the several currently un-named species groups is beyond the scope of this paper.

#### Subgenus *Busycon* (*sensu stricto*)

*Fulgur* DENYS DE MONTFORT, 1810, Conch. Syst., vol 2, p. 502, type species: *Fulgur eliceans* DENYS DE MONTFORT, 1810 = *Busy-*

[4]Following the erection of the genus *Fulgur* by DENYS DE MONTFORT (1810), the family assignment of the group suffered many vicissitudes as indicated by the following allocations: Fasciolariidae (H. ADAMS and A. ADAMS, 1853; DALL, 1890), Buccinidae (TRYON, 1883), Fusidae (ZITTEL, 1881-1885); Turbinellidae (FISCHER, 1884), Galeodidae (THIELE, 1931; WENZ, 1943), Neptuneidae (JOHNSON, 1934), Xancidae (DAVIES, 1935). GRABAU and SHIMER (1909) elevated the group to full family status, Fulguridae [=Busyconidae]; however, most American workers now recognize the group as a subfamily, Busyconinae.

*con eliceans* (DENYS DE MONTFORT, 1810) [by original designation]; *Fulgus* "MONTF[ORT]" DESMAREST [in] CHENU, 1856, Encyclop. Hist. Nat., Crust. Moll. Zoolph., p. 179.

*Sycopsis* CONRAD, 1867, Am. Jour. Conch., vol. 3, p. 184, type species: *Fulgur tuberculatus* CONRAD, 1840 = *Busycon tuberculatum* (CONRAD, 1840) [by subsequent designation, EMERSON, 1953:64].

*Echinofulgar* OLSSON and HARBISON, 1953, Acad. Nat. Sci. Phila., monogr. no. 8, p. 212, type species: *Fulgar echinatum* DALL, 1890 = *Busycon echinatum* (DALL, 1890) [by original designation].

TYPE SPECIES: *Murex carica* GMELIN, 1790 = *Busycon carica* (GMELIN, 1790) [by subsequent designation, B. SMITH, 1938:261].

GEOLOGIC RANGE: [?Eocene], Oligocene to Recent.

DIAGNOSTIC CHARACTERS: Shell large to very large; axial sculpture typically spinose or tuberculate on the periphery of the whorls, rarely with a second row of smaller spines on the body whorl; whorls not separated by canaliculate suture; periostracum simple, not ciliated; radular dentation: rhachidian tooth 5-6 dentate, laterals 5-6 dentate, *fide STIMPSON* (1865:61).

Section *Echinofulgar* OLSSON and HARBISON, 1953

REMARKS: Characterized by the development of a second row of reduced spines below the primary row on the periphery of the whorl, as in the type species, *B. echinatum* (DALL, 1890). OLSSON and HARBISON (1953:212) point out the striking resemblance of this sepcies to some Eocene species of *Levifusus*, particularly *L. branneri* HARRIS, 1896; this probably represents convergence. HACKNEY 1944) and MAGALHAES (1948) state that a second row of spines rarely occurs in Recent specimens of *B. carica* (GMELIN, 1790); similarly, B. SMITH (1944) reports that a second row of spines is rare on *B. contrarium* (CONRAD, 1840); this phenomenon has been noted in a Miocene specimen of *B. contrarium* from North Carolina and a Pleistocene specimen of *B. carica* from North Carolina (SMITH, B., 1943:4, 5). However, unlike *B. echinatum*, the second row of spines appears above the shoulder angle. MAGALHAES (1948:385), on the basis of population studies of *B. carica* from near Beaufort, North Carolina, estimates that this abnormality is manifested in one individual in every three hundred specimens.

Subgenus *Busycotypus* WENZ, 1943

*Sycotypus* "BROWNE" GILL, 1867, Am. Jour. Conch., vol 3, p. 147, type species: *Murex canaliculatus* (LINNÉ, 1758) = *Sycotypus canaliculatus* (LINNÉ, 1758) = *Busycon canaliculatum* (LINNÉ, 1758) [by original designation]; *Sycotopus* CONRAD, 1855, U. S. House of Representatives Doc. no. 129, p. 19; *Syctopus* CONRAD, 1857, Rept. Explor. Surv. Pacific R.R., vol. 5, pt. 2, App. art. 2, pp. 319, 329; *Sycotyphus* CONRAD, 1865, Am. Jour. Conch., vol. 1, p. 151 [all of CONRAD'S citations are errors for/or emendations of *Sycotypus* "BROWNE" GILL, 1867]. Not *Sycotypus* MÖRCH, 1852, Cat. Conch. Yoldi, vol. 1, p. 110.

*Busycotypus* WENZ, 1943, Handb. Paläzool., vol. 6, Gastropoda, div. 6, pt. 8, p. 1219, [new name for *Sycotypus* GILL, 1867, not MÖRCH, 1852.].

*Fulguropsis* MARKS, 1950, Nautilus, vol. 64, no. 1, p. 34, type species: *Bulla pyrum* DILLWYN, 1817 = *Busycon spiratum* (LAMARCK, 1816) [by original designation; new subgenus replacing "*Sycotypus* GILL, 1867, not GRAY, 1847"].

*Sycofulgar* MARKS, 1950, Nautilus, vol. 64, no. 1, p. 34, type species: *Fulgur rugosus* CONRAD, 1843 = *Busycon rugosum* (CONRAD, 1843) [by original designation].

TYPE SPECIES: *Murex canaliculatus* LINNÉ, 1758 = *Busycon canaliculatum* (LINNÉ, 1758).

GEOLOGIC RANGE: Miocene to Recent.

DIAGNOSTIC CHARACTERS: Shell large to very large; whorls separated by deep canaliculate suture; axial sculpture typically tuberculate in juveniles, uniting, in senility, to form rounded or keeled shoulders on the periphery of the whorls; periostracum ciliated; radular dentation: rhachidian tooth 3 dentate, laterals 4-5 dentate, *fide* STIMPSON, (1865:60).

REMARKS: *Sycotypus* is often ascribed to BROWNE (1756:406) *Civil and Natural History of Jamaica*, a pre-Linnaean work which was reprinted in 1789. GILL (1867:147) maintained that BROWNE'S reference to "the smaller, hairy fig-shell" applied to *B. canaliculatum* (LINNÉ, 1758), a species not known to occur in Jamaica; however, GRAY (1847:135) referred *Sycotypus* to *Pyrula* [= *Ficus*], which does not possess a hairy epdiermis. As pointed out by GARDNER (1944:457) this problem is purely academic as BROWNE'S names are not available. GRAY (1847:135) listed "*Sycotypus* BROWNE, 1756" in the synonymy of *Pyrula* of LAMARCK without definitely indicating acceptance of the name. MÖRCH (1852:110) validated *Sycotypus* and applied the name to *Ficus* 'BOLTEN' RÖDING, 1798. Unfortunately, *Sycotypus* was not available when GILL designated *B. canaliculatum* the type species and described the genus. *Busycotypus* must, therefore, be applied to the *Sycotypus* group.

*Sycofulgur* was proposed by MARKS (1950:34) for *B. rugosum* and differentiated from *Busycotypus* by "having nodes on its shell throughout its growth." Under the present classification of the genus, *Sycofulgur* does not appear to warrant even sectional recognition as a higher nomenclatural category.

? Subgenus *Protobusycon* WADE, 1917

*Protobusycon* WADE, 1917, Am. Jour. Sci., ser. 4, vol. 43, p. 295; COSSMANN, 1917, Rev. Critique Páleozool., Année 20, no. 3, p. 100; WADE, 1926, U. S. Geol. Surv., Prof. Paper 137, p. 136.

TYPE SPECIES: *Busycon cretaceum* WADE, 1917 [by monotypy].

GEOLOGIC RANGE: Upper Cretaceous [Ripley formation, McNairy County, Tennessee (Senonian)].

DIAGNOSTIC CHARACTERS: Shell small for genus; character of protoconch unknown; axial sculpture restricted to low, sub-spinose nodules upon periphery of the whorls; a secondary keel outlines base of body whorl, keel beset with 4-5 obsolete spines; shallow sulcus at base of body whorl, terminating as a slight projection at the margin of the inner lip.

REMARKS: The questionable status of this unit is discussed in the section pertaining to the geologic history of the subfamily, see p. 117.

## CATALOGUE OF SPECIFIC AND INFRA-SPECIFIC NAMES IN THE BUSYCONINAE

*Introduction.*—This catalogue is the result of an exhaustive search of the literature and is a compilation of the specific and infra-specific names which have been referred to *Busycon* (*sensu lato*). A total of 107 trivial names were found to have been allocated to the genus; of this number, 76 are referable to the genus, 19 were erroneously placed in/or assigned to the genus, 6 are nude names, 2 are errors for/or emendations of valid names, 2 are questionably retained in the genus by the authors, 1 is preoccupied but is a junior synonym of a valid name, 1 is listed as "sp."

A review of the type localities for the 76 names which can be definitely allocated to the genus indicates the following age assignments: Oligocene 2, Miocene 42, Pliocene 12, Recent 17; 3 are from questionable or unknown type localities. Of this total, 54 names were proposed by four authors, namely: Conrad (28), Gardner (12), Dall (8) and Mansfield (6).

*Procedure and methods.*—In the catalogue below, the following format is used, the trivial names are listed alphabetically with the exact orthography used by the original author and followed by: the initial generic assignment in brackets, reference to the original description and references to figured specimens, the type locality, additional records of occurrence, and remarks which are largely derived from the literature. Junior synonyms are compiled from the literature as are "varieties," which include all specific and infra-specific names that have been described and assigned by the original author or have been subsequently referred to as varieties and subspecies of a specific name. The résumé is a brief review of all senior and junior synonyms, based upon the literature. Names which are preceded by an asterisk (*) were erroneously placed by the original author or reassigned by a subsequent author to the genus *Busycon* (*sensu lato*); in cases of subsequent reassignment, the first author to erroneously place a trivial name in the Busyconinae is cited first whether he be the original author of the species or a subsequent revisor.

*adversarium* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 560, 584; 1867, Am. Jour. Conch., vol. 3, pp. 184, 185 [as *Busycon*].

TYPE LOCALITY: Pliocene ?—Godfrey's Ferry, Pee Dee River, Horry County, South Carolina; "Smith's, Goose Creek" = "The Plantation of the Late Geo. Henry Smith, Esq.; . . .", South Carolina (Tuomey and Holmes, 1857:xi).

REMARKS: Conrad (1863:584) did not describe this species but referred his name *adversarium* to *B. perversum* Tuomey and Holmes, 1857, Pleioc. fossils So. Car., pp. 145-146, pl. 29, fig. 3 [not fig. 2], not *B. perversus* (Linné, 1758). Conrad's (1863:584 [not p. 560]) *carolinense*, [not *carolinensis* Tuomey and Holmes (1857)], = *adversarium* Conrad (1863) as both species are based on the same figure of Tuomey and Holmes (1857: pl. 29, fig. 3). B. Smith (1939:26) con-

siders this species to represent a fairly mature example of *contrarius* Conrad (1840).

JUNIOR SYNONYM: *carolinense* Conrad (1863: 584 [not p. 560]).

RÉSUMÉ: *contrarius* Conrad (1840) = ? *gibbosum* Conrad (1854) = *adversarium* Conrad (1863) = *carolinense* Conrad (1863:584 [not p. 560]).

*aepynotum* [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 113-114; Mansfield, 1930, Florida Geol. Surv., Bull. no. 3, p. 69, pl. 8, figs. 1, 6 [as *Busycon*].

TYPE LOCALITY: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Dall, 1890:113-114) and (Mansfield, 1930:69).

REMARKS: Dall (1890:113-114) considered this species to be a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

*affine* [*Busycon*] Sowerby, H. Adams and A. Adams, 1853, Gen. Recent Moll., vol. 1, p. 151 [*nomen nudum*].

REMARKS: H. Adams and A. Adams (1853:151) placed this name in the genus *Busycon.* Tryon (1881:232) stated "*Busycon affine* Sowerby" H. Adams and A. Adams (1853:151) "was not published."

**africanus* [*Fulgur*] Sowerby, 1897, Marine Shells of South Africa, App. p. 1, pl. 6, fig. 19 [not seen].

TYPE LOCALITY: Recent—Port Elizabeth, Cape of Good Hope, Union of South Africa (Smith, E. A., 1903, Proc. Malac. Soc. London, vol. 5, p. 368).

REMARKS: Not a *Busycon;* a species of *Fusus* erroneously placed in *Fulgur* (Smith, E. A., 1903, Proc. Malac. Soc. London, vol. 5, p. 368).

*aldrichi* [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 450, pl. 49, figs. 11, 12.

TYPE LOCALITY: Middle Miocene—Shoal River formation, Alum Bluff group: Crowder's Crossing, ½ mile below Shell Bluff, Shoal River, Walton County, Florida (Gardner, 1944:450).

OCCURRENCE: Middle Miocene—Shoal River formation, Alum Bluff group 1½ miles below Shell Bluff, Shoal River, Walton County, Florida (Gardner, 1944:450).

*alumense* [*Busycon*] Mansfield, 1930, Florida Geol. Surv., Bull. no. 3, p. 66, pl. 7, figs. 3, 4.

TYPE LOCALITY: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Mansfield, 1930:66).

OCCURRENCE: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: station 1/962, cut in old road to Watson's Landing, Liberty County, Florida (Mansfield, 1930:66).

REMARKS: Mansfield described *alumense* as a variety of *maximus* Conrad (1839).

*alveatum* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 583-584; 1866, Am. Jour. Conch., vol. 2, p. 68, pl. 3. fig. 7 [as *Busycon*]; Gill, 1867, Am. Jour. Conch., vol. 3, p. 149 [as *Sycotypus*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 524, fig. 8 [as *Sycotypus*].

TYPE LOCALITY: Miocene—St. Marys formation?: St. Marys Riv-

er, St. Marys County, Maryland (Conrad, 1863:583-584) and (Gill, 1867:149).

REMARKS: Conrad (1863:583-584) described this species from one specimen; Dall (1890:112) considered *alveatum* Conrad (1863) a junior synonym of *pyrum incile* Conrad (1833).

RÉSUMÉ: *incile* Conrad (1833) = ? *conradi* Tuomey and Holmes (1857) = ? *canaliferum* Conrad (1863 = *alveatum* Conrad (1863).

*amoenum* [*Busycon*] Conrad, 1875, [in] Kerr, Geol. Surv. No. Car. Rept., vol. 1, App. A, p. 23; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, pp. 238-239, pl. 34, figs. 2, 4-6, pl. 35, fig. 5 [as *Busycon*].

TYPE LOCALITY: Pliocene—Waccamaw formation: Walker's Bluff, Cape Fear River, Bladen County, North Carolina (Conrad, 1875:23) and (Gardner, 1948:238-239).

OCCURRENCE: Upper Miocene—Duplin marl ?: 4 to 5 miles below Lumberton, Robeson County, North Carolina (Gardner, 1948:238-239). Pliocene—Waccamaw formation: Neills Eddy Landing, Cape Fear River, 3 miles north of Cronly, Columbus County, North Carolina (Gardner, 1948:238-239).

**argutus* [*Fulgur*] Clark, 1895, Johns Hopkins Univ. Circ., vol. 15, no. 121, p. 4.

TYPE LOCALITY: "Eocene"—Pamunkey group ?: Potomac Creek, Virginia; Pamunkey Neck, Maryland (Clark, 1895:4).

REMARKS: Not a *Busycon;* may be referred to *Fulguroficus argutus* (Clark, 1895).

*aruanus* [*Murex*] Linné [in part], 1758, Syst. Nat., ed. 10, vol. 1, p. 753; 1767, ed. 12, vol. 1, pt. 2, p. 1222 [as *Murex*]; Conrad, 1868, Am. Jour. Conch., vol. 3, p. 266, pl. 20, fig. 4 [*as Busycon*].

TYPE LOCALITY: Recent—New Guinea (Linné, 1758:753).

OCCURRENCE: Recent—East Coast of the United States from Cape Cod, Massachusetts to Cape Canaveral, Florida (Gardner, 1944:449).

REMARKS: B. Smith (1938:18) stated that *aruanus* Linné (1758) actually represented two distinct species; one, an American shell, was renamed *carica* by Gmelin (1790), the other species, an Australian shell, was later named *Fusus proboscidiferus* by Lamarck (1822). The first revisor's rule favors the retention of *carica* for the American shell.

RÉSUMÉ: *aruanus* Linné (1758) [in part] = *carica* Gmelin (1790) = *muricatum* 'Bolten' Röding (1798) = *spinosum* Conrad (1863).

*atraktoides* [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 450, pl. 49, figs. 9, 10.

TYPE LOCALITY: Middle Miocene—Oak Grove sand, Alum Bluff group: old Senterfeit mill, 4½ miles southwest of Laurel Hill, Walton County, Florida (Gardner, 1944:450).

REMARKS: Gardner (1944:450) believed this species to be apparently restricted in its distribution to the type locality.

*ballastense* [*Busycon*] Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, p. 120.

TYPE LOCALITY: Lower Miocene—Tampa limestone: "silex beds" at Ballast Point, Tampa Bay, Hillsborough County, Florida (Mansfield, 1937:120, table 1).

REMARKS: Mansfield described *baalastense* as a variety of *tampaensis* Dall (1890); the species is known only from the type locality. Mansfield (1937:120) considered *ballastense* to represent *Busycon spiniger nodulatum* Dall, 1915, Bull. U. S. Nat. Mus., no. 90, p. 67, pl. 9, fig. 5, not *nodulatum* Conrad (1849), and not the records from the Chipola formation referred to by Dall (1915). See *sicyoides* Gardner (1944).

**bicarinatus* [*Fusus*] I. Lea, 1833, Contrib. Geology, p. 146, pl. 5, fig. 147.

TYPE LOCALITY: Eocene ? — Claiborne, Monroe County, Alabama (I. Lea, 1833:29, 31).

REMARKS: Not a *Busycon*. Conrad (1854:317) considered *bicarinatus* a junior synonym of *Fulgur trabeatum* (Conrad, 1833); may now be referred to as *Levifusus trabeatus* (Conrad, 1833).

RÉSUMÉ: *trabeatus* Conrad (1833) = *bicarinatus* I. Lea (1833).

*bladenense* [*Busycon*] Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, pp. 239-240, pl. 35, figs. 2, 4.

TYPE LOCALITY: Pliocene—Waccamaw formation: Walker's Bluff, Cape Fear River, Bladen County, North Carolina (Gardner, 1948: 239-240).

OCCURRENCE: Upper Miocene—Duplin marl: 2 miles below Lumberton on the Lumberton River, Robeson County, North Carolina (Gardner, 1948:239-240). Pliocene—Waccamaw formation: Neills Eddy Landing, 3 miles north of Cronly, Columbus County, North Carolina (Gardner, 1948:239-240).

REMARKS: Characterized by the possession of a broad, horizontal shoulder on which the spiral sculpture is limited to a few feeble lirations (Gardner, 1948:239-240).

**blakei* [*Busycon* ?] Conrad, 1855, U. S. House of Representatives Doc. no. 129, p. 11; 1857, Pacific R.R. Repts., vol. 5, pl. 2 [not pl. 1], fig. 13 [as "*Busycon* ?"].

TYPE LOCALITY: Eocene—Tejon formation: Cañada de las Uvas [Grapevine Canyon], Kern County, California (Conrad, 1855:11) and (Conrad, 1857).

REMARKS: Not a *Busycon;* may be referred to *Pseudoperissolax blakei* (Conrad, 1855).

*blountense* [*Busycon*] Mansfield, 1935, Florida Geol. Surv., Bull. no. 12, p. 33, pl. 3, figs. 3, 4.

TYPE LOCALITY: upper Middle Miocene—Choctawhatchee formation [*Arca* zone (upper part)]: station 12046, upper locality, Vaughan Creek, Walton County, Florida (Mansfield, 1935:33).

REMARKS: *blountense* Mansfield (1935) is questionably retained in the genus *Busycon;* this species is known only from the type locality.

*burnsii* [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 110-111; Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 456, pl. 50, figs. 3, 4 [as *Busycon*].

TYPE LOCALITY: Lower Miocene—Chipola formation, Alum Bluff group: lower bed at Alum Bluff, vicinity of Bailey's Ferry, Liberty County, Florida (Dall, 1890:110-111) and (Gardner, 1944:456).

REMARKS: Dall (1890:110-111) considered *burnsii* a variety of

*spiniger* Conrad (1848); Gardner (1944:456) believed *burnsii* to be a distinct species.

*canaliculatus* [*Murex*] Linné, 1758, Syst. Nat., ed. 10, vol. 1, p. 753; Lamarck, 1822, Hist. Nat. An. s. Vert., vol. 7, pp. 137-138 [as *Pyrula*]; 1827, Encyclop. Meth., vol. 3, pl. 436, fig. 3 [as *Pyrula*]; Holmes, 1860, Post-Pleioc fossils So. Car., pp. 66-67, pl. 11, fig. 3 [as *Busycon*]; Dall, 1889, Bull. U. S. Nat. Mus., no. 37, p. 112, pl. 73, fig. 1 [as *Fulgur*]; Clark, 1906, [in] Shattuck, Maryland Geol. Surv., Plioc. and Pleistoc., p. 180, pls. 46, 47, 48 [as *Fulgur*].

TYPE LOCALITY: Recent—Canada (Linné, 1758:753).

OCCURRENCE: Miocene—St. Marys formation ?: St. Marys River, St. Marys County, Maryland (Conrad: 1854:317). Upper Miocene ?—Duplin marl ?: Natural Well, Duplin County, North Carolina (Conrad, 1854:317). Pliocene—Caloosahatchee formation [Nashua marl]: ½ mile SW of Golf Club, DeLeon Springs, Volusia County, Florida (Mansfield, 1939:30-31). "Post-Pliocene"—North Carolina and South Carolina (Tuomey, 1860:67). Pleistocene—Talbot formation: Wailes Bluff, near Cornfield Harbor, St. Marys County, Maryland (Clark, 1906:180). At Seaboard Air Lines R.R. crossing of Highway 41, north of Estero, Lee County, Florida; North Creek, near Osprey, Sarasota County, Florida (Richards, 1938:1289, 1293). New Orleans, Orleans Parish, Louisiana well of 1856 (Maury, 1922:86). Recent—Cape Cod, Massachusetts to St. Augustine, Florida (Johnson, 1934: 127).

REMARKS: Mansfield (1930:69) questionably referred several young specimens from the Choctawhatchee formation, near Hosford, Liberty County, Florida, and Harvey's Creek, Leon County, Florida to *canaliculatus* Linné (1758); however, Gardner (1948:242) believed that Mansfield's material is very similar to specimens of *concinnum* Conrad (1875) from the Waccamaw formation of North Carolina.

JUNIOR SYNONYM: *granulata* Link (1807).

VARIETIES: *granum* Linné (1758, 1767).

? *coronatus* Conrad (1840)

? *canaliferum* Conrad (1863) = *carolinensis* Emmons (1858)

*canaliferum* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 560; Gill, 1867, Am. Jour. Conch., vol. 3, p. 149 [as *Sycotypus*]; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 113 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, pp. 525, 539 [as *Sycotypus*].

TYPE LOCALITY: Pliocene—Waccamaw formation: Grissett's Landing, Waccamaw River, above Conway ["Conwayborough"], Horry County, South Carolina (Tuomey and Holmes, 1857:xi, 146).

OCCURRENCE: Miocene—North Carolina and South Carolina (Gill, 1867:149). Upper Miocene ?—Duplin marl ?: marl, Cape Fear River, North Carolina (Emmons, 1858:250). Upper Miocene—Yorktown formation: 1½ miles north of Suffolk, Nansemond County, Virginia (Gardner, 1948:242). Pliocene—Waccamaw formation: South Carolina (Gardner, 1948:242).

REMARKS: Conrad (1863:56) referred *canaliferum* to *Busycon canaliculatum* Tuomey and Holmes, 1857, Pleioc. fossils So. Car., p. 146

[not p. 145], pl. 29, fig. 2, not *canaliculatus* Linné (1758) *sensu stricto*. Dall (1890:112) considered *canaliferum* a junior synonym of *pyrum incile* Conrad (1833); Gardner (1948:242) believed it to represent a variety of *canaliculatus* Linné (1758). Conrad (1863:560) and Gardner (1948:242) considered *Pyrula carolinensis* Emmons, 1858, No. Car. Geol. Surv. Rept., pp. 249-250, fig. 108 [not *carolinensis* Tuomey and Holmes (1857)] to be synonymous with *canaliferum* Conrad (1863).

*candelabrum* [*Pyrula*] Lamarck, 1822, Hist. Nat. An. s. Vert., vol. 7, p. 139; 1827, Encyclop. Méth., vol. 3, pl. 437, fig. 3 [as *Pyrula*].
TYPE LOCALITY: Recent—not given.
REMARKS: Gill (1867:145) considered *candelabrum* a junior synonym of *carica* Gmelin (1790); Tryon (1881:141) believed the species to represent exaggerated specimens of *eliceans* Denys de Montfort (1810) and therefore a junior synonym of *eliceans;* Grabau (1903: 531) considered *candelabrum* a variety of *eliceans* Denys de Montfort (1810).

*caniculatus* [*Murex*] Turton, 1806, [in] Linné, Syst. Nat., vol. 4, pp. 443-444; Say, 1822, Jour. Acad. Nat. Sci. Phila., ser. 1, vol. 2, p. 238 [as *Fulgur*].
TYPE LOCALITY: Recent—Canada and the Frozen Sea (Turton, 1806:443-444).
REMARKS: Error for ? *canaliculatus* Linné (1758); reference to Martini, pl. 67, fig. 742 only.

*carica* [*Murex*] Gmelin, 1790, Syst. Nat., ed. 13, vol. 1, pt. 6; p. 3545; Holmes, 1860, Post-Pleioc. fossils So. Car., p. 65, pl. 11, fig. 1 [as *Busycon*]; Gill, 1867, Am. Jour. Conch., vol. 3, p. 145 [as *Fulgur*]; Tryon, 1881, Man. Conch., vol. 3, pp. 140-141, pl. 57, figs. 387-389 [not fig. 390], pl. 58, fig. 400 [as *Fulgur*]; Dall, 1889, Bull. U. S. Nat. Mus., no. 37, p. 112, pl. 74, fig. 1 [as *Fulgur*]; 1890, Trans. Wagner Free Inst., Sci., vol. 3, pt. 1, p. 117 [as *Fulgur*]; Clark, 1906, [in] Shattuck, Maryland Geol. Surv., Plioc. and Pleistoc., p. 179, pls. 43, 44, 45 [as *Fulgur*].
TYPE LOCALITY: Recent—not given.
OCCURRENCE: Miocene—North Carolina (Conrad, 1854:318). Maryland (Holmes, 1860:65). Pliocene—North Carolina and South Carolina (Holmes, 1860:65). "Post-Pliocene"—Simmon's Bluff, Yonge's Island, Charleston County, South Carolina (Holmes, 1860: acknowledgements, 65). Pleistocene—Talbot formation: Wailes Bluff near Cornfield Harbor, St. Marys County, Maryland (Clark, 1906:179). Rose Bluff, south bank of Bell River, a branch of the St. Marys River, Nassau County, Florida; Dredging from St. John's River, opposite Mayport, Duval County, Florida; Fill along east side of Halifax River, a mile north of Ormond Beach, Volusia County, Florida; Daytona Beach, fill on west side of Halifax River, Volusia County, Florida; Spoil banks of Crane Creek Canal, 4½ miles west of Melbourne, Brevard County, Florida; "Haulover" between Indian River and Mosquito Lagoon, Allenhurst, Brevard County, Florida; Vero Beach, dredgings from canal west of spillway, Indian River County, Florida; Dredgings from Fort Pierce Harbor, St. Lucie County, Florida; Drainage ditch, 6 miles south of Fort Myers, Lee County,

Florida; North Creek, near Osprey, Sarasota County, Florida (Richards, 1938:1289, 1293). Shell ridge at Grand Chenier, Cameron Parish, Louisiana (Richards, 1939a:307,313). Recent—Cape Cod, Massachusetts to St. Thomas Island, West Indies (Smith, M., 1951:124). Gulf Coast, west Florida, and Galveston, Texas (Maury, 1922:86).

REMARKS: B. Smith (1938) considered *carica* Gmelin (1790) to be the genotype of *Busycon*.

JUNIOR SYNONYMS: *muricatum* 'Bolten' Röding (1798)
*spinosum* Conrad (1863)

VARIETIES: *eliceans* Denys de Montfort (1810) = *candelabrum* Lamarck (1822).

RÉSUMÉ: *aruanus* Linné (1758) [in part] = *carica* Gmelin (1790) = *muricatum* 'Bolten' Röding (1798) = *spinosum* Conrad (1863).

*carinatum* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 286, 560; 1868, Am. Jour. Conch., vol. 3, pp. 265-266, pl. 19, fig. 2. [as *Busycon*]; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 117 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 528, fig. 12 [as *Fulgur*]; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 240, pl. 35, fig. 6 [as *Busycon*].

TYPE LOCALITY: Miocene—Virginia (Conrad, 1863:286, 560).

OCCURRENCE: Miocene—Maryland and Virginia (Dall, 1890: 117).

REMARKS: Gardner (1948: pl. 35, fig. 6) figured the holotype and stated that the species has not been recognized in later collections.

*carolinensis* [*Cassidulus*] Toumey and Holmes, 1857, Pleioc. fossils So. Car., pp. 147-148, pl. 30, fig. 1; Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 560 [not p. 584] [as *Busycon*].

TYPE LOCALITY: Pliocene ?—Sumter County, South Carolina (Tuomey and Holmes, 1857:148).

REMARKS: Conrad (1863:560) questionably referred *carolinensis* Tuomey and Holmes (1857) to *excavatus* Conrad (1840); Gill (1867: 150) placed the species in the synonymy of *excavatus* Conrad (1840); Dall (1890:112) considered the species a junior synonym of *pyrum excavatum* Conrad (1840). Note: *carolinensis* Tuomey and Holmes 1857), not *Pyrula carolinensis* Emmons, 1858, No. Car. Geol. Surv. Rept., pp. 249-250, fig. 108 [see remarks under *canaliferum* Conrad 1863)].

*carolinense* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 584 [not p. 560], not *carolinensis* Tuomey and Holmes (1857).

TYPE LOCALITY: Pliocene ?—Godfrey's Ferry, Pee Dee River, Horry County, South Carolina; "Smith's, Goose Creek" = "The plantation of the Late Geo. Henry Smith, Esq.; . . .", South Carolina (Tuomey and Holmes, 1857:xi).

REMARKS: Conrad (1863:584) referred to Tuomey and Holmes, 1857, pl. 29, fig. 3, as an illustration of his species *carolinense*, this is the same plate and figure reference that Conrad (1863:560) cited for *adversarium* Conrad (1863), therefore, *carolinense* Conrad (1863: 584 [not p. 560] is junior synonym of *adversarium* Conrad (1863:560). It should be noted that *adversarium* Conrad (1863:560) referred to Tuomey and Holmes, 1857, pl. 29, fig. 3, whereas *adversarium* (1863: 584) referred to Tuomey and Holmes 1857, pl. 29, fig. 2.

RÉSUMÉ: *contrarius* Conrad (1840) = ? *gibbosum* Conrad (1854) =

*adversarium* Conrad (1863) = *carolinense* Conrad (1863:584 [not p. 560)].

*chowanense* [*Busycon*] Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 241, pl. 36, fig. 4.
TYPE LOCALITY: Upper Miocene—Yorktown formation: ½ to ¾ of a mile above Edenhouse Point, Chowan River, Bertie County, North Carolina (Gardner, 1948:241).
OCCURRENCE: Upper Miocene—Yorktown formation: "(?) York-County, Virginia." (Gardner, 1948:241).
(Gardner, 1948:242).
REMARKS: Described from an imperfect specimen which is characterized by regularly convex spiral fillets and the lack of axial sculpture (Gardner, 1948:241).

*cingulatum* [*Busycon*] 'Bolten' Röding, 1798, Mus. Boltenianum, pt. 2, p. 149 [*nomen nudum*]; Smith, B., 1938, Nautilus, vol. 52, no. 1, p. 17.

*coarctata* [*Pyrula*] Sowerby, 1825, Cat. Shells Tankerville, App. p. 17; Petit de la Saussaye, 1852, Jour. de Conch., vol. 3, pp. 145, 155, pl. 7, fig. 3 [as *Pyrula*]; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 117 [as *Fulgur*]; Clench, 1951, Occas. Paps. Mollusks, vol. 1, no. 16, pp. 405-409, pl. 50, [as *Busycon*].
TYPE LOCALITY: Recent—not given.
OCCURRENCE: Recent—Campeche Bank [21°31'N. Lat., 90°20'W. Long., in 16 fathoms], Yucatan, Mexico (Clench, 1952:408).
REMARKS: Johnson (1934:126) considered the fossil species *rapum* Heilprin (1887) an antecedent of *coarctata* Sowerby (1825).

*concinnum* [*Busycon*] Conrad, 1875, [in] Kerr, No. Car. Geol. Surv. Rept., vol. 1, App. A, pp. 23-24; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 242, pl. 33, figs, 1, 3 [as *Busycon*].
TYPE LOCALITY: Pliocene—Waccamaw formation ?: "Mr. King's marl", Sampson County, North Carolina (Conrad, 1875:23) and (Gardner, 1948-242).
OCCURRENCE: Upper Miocene ?—Duplin marl ?: Cape Fear River, 10 miles above Elizabethtown, Bladen County, North Carolina (Johnson, 1903:75). Pliocene—Waccamaw formation: Walker's Bluff, Cape Fear River, Bladen County, North Carolina; Neills Eddy Landing, Cape Fear River, Columbus County, North Carolina (Gardner, 1948: 242).

*conradi* [*Busycon*] Tuomey and Holmes, 1857, Pleioc. fossils So. Car., p. 147, pl. 29, fig. 4; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 242, pl. 33, fig. 2 [as *Busycon*].
TYPE LOCALITY: Upper Miocene—Duplin marl: Sumter County, South Carolina (Tuomey and Holmes, 1857:147) and (Gardner, 1948: 242).
REMARKS: Conrad (1863:561) assigned this species to the synonymy of *incile* Conrad (1833); Dall (1890:112) considered *conradi* a junior synonym of *pyrum incile* Conrad (1833). Grabau (1903:524-525) and Gardner (1948:242) stated that *conradi* Tuomey and Holmes (1857) is a good species which parallels *incile* Conrad (1833) in morphologic development.

*contrarius* [*Fulgur*] Conrad, 1840, Am. Jour. Sci., ser. 2, vol. 39, p. 387; 1861, Fossile Med. Tert. U. S., no. 4, pp. 81-82, pl. 45, fig. 11 [as

*Busycon*]; 1868, Am. Jour. Conch., vol. 3, p. 266, pl 23, fig. 2 [as *Busycon*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 532, fig. 16 [as *Fulgur*]; Smith, B., 1944, Palaeontographica Americana, vol. 3, no. 17, pp. 163-169, pl. 15, figs. 1-6 [as *Busycon*]; Smith, M., 1951, East Coast Marine Shells, ed. 4, pp. 124-125, pl. 40, fig. 18 [dextral], pl. 48, fig. 4, pl. 49, fig. 7, pl. 58, fig. 1 [monstrosity] [as *Busycon perversum* Linné (1758)].

TYPE LOCALITY: Upper Miocene—Duplin marl: Natural Well, Duplin County, North Carolina (Conrad, 1840:387) and (Smith, B., 1939:26).

OCCURRENCE: Miocene—North Carolina and South Carolina (Gill, 1867:146). Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida [dredge dumps] (Olsson and Harbison, 1953: 211). Pleistocene—Live Oak Bar formation: west shore of San Antonio Bay, Refugio County, Texas; Intracoastal Waterway dredge dumps, Aransas Bay, Texas (Univ. Calif. Mus. Paleo. locs. A-9597 and A-7414). Recent—Cape Hatteras, North Carolina to Cuba [as *Busycon perversum* Linné (1758)] (Smith, M., 1951:125). Aransas Bay, Texas (Univ. Calif. Mus. Paleo. loc. A-7565).

REMARKS: Conrad (1863:560) stated that *contrarius* Conrad (1840) = *Busycon perversum* Emmons, 1858, No. Car. Geol. Surv. Rept., pp. 107, 249, not *perversus* Linné (1758); see remarks under *perversus* Linné (1758).

JUNIOR SYNONYMS: ? *gibbosum* Conrad (1854)
*adversarium* Conrad (1863)
*carolinense* Conrad (1863:584 [not p. 560]).

*coronatus* [*Fulgur*] Conrad, 1840, Fossils Med. Tert. U. S., no. 2, cover p. 4; 1842, Proc. Nat. Instn. Prom. Sci., Bull. 2, p. 187 [as *Fulgur*]; 1861, Fossils Med. Tert. U. S., no. 4, p. 82, pl. 46, fig. 1 [as *Busycon*]; 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 560 [as *Busycon*]; 1868, Am. Jour. Conch., vol. 3, p. 267, pl. 24, fig. 1 [as *Sycotypus*]; Harris, 1893, Am. Jour. Sci., ser. 3, vol. 45, pp. 24, 28 [as *Fulgur*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 180-181, pl. 46, figs. 1a, 1b [as *Fulgur*].

TYPE LOCALITY: Miocene—St. Marys formation: St. Marys River, St. Marys County, Maryland (Conrad, 1861:82) and (Martin, 1904: 180-181).

OCCURRENCE: Miocene—St. Marys formation: Cove Point (?), Calvert County, Maryland (Martin, 1904:180-181).

REMARKS: It is quite possible that *coronatus* Conrad (1840) is a variety of *canaliculatus* Linné (1758).

**crassicauda* [*Busycon*] Philippi, H. Adams and A. Adams, 1853, Gen. Recent Moll., vol. 1, p. 151.

TYPE LOCALITY: Recent—China (Philippi, 1848:98).

REMARKS: Not a *Busycon*. Originally described as *Pyrula crassicauda* Philippi, 1848, Zeitsch. Malak., p. 98; may be referred to *Hemifusus tuba* (Gmelin, 1790).

*cretaceum* [*Busycon*] Wade, 1917, Am. Jour. Sci., ser. 4, vol. 43, pp. 296-297, figs. 1, 2; Wenz, 1943, Hand. Paläozool., vol. 6, Gastropoda, div. 6, pt. 8, pp. 1218-1219, fig. 3464 [as *Busycon*].

TYPE LOCALITY: Upper Cretaceous—Ripley formation: Dave

Weeks Place on Coon Creek, McNairy County, Tennessee (Wade, 1917:296-297).

REMARKS: This species is known only from one specimen from the type locality (Wade, 1917:297). Stephenson, 1941, Univ. Texas Publ. no. 4101, p. 324, considered incomplete internal and external molds of a large gastropod from the Nacatoch sand, Navarro group (Upper Cretaceous) of Texas to have some features in common with *cretaceum* Wade (1917), but concluded that the material was not sufficient to be considered conspecific. This species is questionably retained in the genus *Busycon*.

**dallianum* [*Fulgur* ?] Harris, 1896, Bull. Am. Paleo., vol. 1, no. 4, pp. 210-211, pl. 9, fig. 13.

TYPE LOCALITY: "Eocene"—Wilcox County, Alabama (Harris, 1896:211).

REMARKS: Not a *Busycon*. Harris (1896:210-211) described *dallianum* from an unique specimen with only an apical fragment preserved; may be questionably referred to *Levifusus* or possibly *Protobusycon*.

*dasum* [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, pp. 451-452, pl. 50, figs. 10, 11.

TYPE LOCALITY: Middle Miocene—Shoal River formation, Alum Bluff group: Flournoy's millrace, 2 miles east of Argyle, Walton County, Florida (Gardner, 1944:451-452).

OCCURRENCE: Middle Miocene—Shoal River formation, Alum Bluff group: 6 miles west-northwest of Mossyhead, Walton County, Florida; Shell Bluff, Shoal River, Walton County, Florida; Near Mossyhead, sec. 6, T.3N., R.21W., Walton County, Florida; Summerville millrace, 1 mile east of Argyle, Walton County, Florida (Gardner, 1944:451-452).

*dubium* [*Busycon*] 'Bolten' Röding, 1798, Mus. Boltenianum, pt. 2, p. 149 [*nomen nudum*]; Smith, B., 1938, Nautilus, vol. 52, no. 1, p. 17.

*dumosum* [*Busycon*] Conrad, 1868, Am. Jour. Conch., vol. 3, p. 266, pl. 19, fig. 3.

TYPE LOCALITY: not given ["Miocene" ?].

REMARKS: Dall (1890:110) considered *dumosum* Conrad (1868) a junior synonym of *spiniger* Conrad (1848).

RÉSUMÉ: *spiniger* Conrad (1848) = *striatum* Conrad (1863) = *dumosum* Conrad (1868).

*echinatum* [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 117-118, pl. 9, fig. 2.

TYPE LOCALITY: Upper Pliocene—Caloosahatchee formation: Caloosahatchee River and Shell Creek, [Lee County ?], Florida (Dall, 1890:117-118).

OCCURRENCE: Upper Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida [dredge dumps] (Olsson and Harbison, 1953:213).

*elegans* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 583; 1867, Am. Jour. Conch., vol. 3, pp. 183-184 [as *Sycotypus*].

TYPE LOCALITY: not given.

REMARKS: Conrad (1867:183-184) considered *elegans* Conrad (1863) a variety of *plagosum* Conrad (1863); Dall (1890:112) placed *elegans*

in the synonymy of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

RÉSUMÉ: *spirata* Lamarck (1816) = *pyrum* Dillwyn (1817) = *pyruloides* Say (1822) = *plagosum* Conrad (1863) = *elegans* Conrad 1863) = *pyriformis* Conrad (1867).

*eliceans* [*Fulgur*] Denys de Montfort, 1810, Conch. Syst., vol. 2, pp. 502-504, fig.; Tryon, 1881, Man. Conch., vol. 3, p. 141 [as *Fulgur*]; Morris, 1951, A field guide to the shells . . ., p. 205, pl. 38, fig. 7 [as *Busycon*].

TYPE LOCALITY: Recent—American seas (Denys de Montfort, 1810:502-504).

OCCURRENCE: Recent—North Carolina to Florida (Johnson, 1934: 126). South Carolina to Campeche, Mexico (Maury, 1922:86).

REMARKS: Gill (1867:145) considered *eliceans* Denys de Montfort (1810) a junior synonym of *carica* Gmelin (1790); Tryon (1881:141), Johnson (1934: 126), and Morris (1951:205) referred to *eliceans* as a variety of *carica* Gmelin (1790).

JUNIOR SYNONYM: *candelabrum* Lamarck (1822).

*elongatus* [*Sycotypus*], Gill, 1867, Am. Jour. Conch., vol. 3, pp. 150-151, text fig.

TYPE LOCALITY: Miocene—North Carolina (Gill, 1867:150-151).

REMARKS: Gill (1867: 150-151) stated that *elongatus* is closely related to *excavatus* Conrad (1840); Dall (1890:112) questionably referred *elongatus* to *pyrum excavatum* Conrad (1840) due to the loss of the unique type specimen (1890:113).

**eocense* [*Fulgur*] Aldrich, 1895, Bull. Am. Paleo., vol. 1, no. 2, p. 62, pl. 3, figs. 7, 7a; Harris, 1899, Bull. Am. Paleo., vol. 3, p. 65, pl. 8, fig. 13 [as *Triton*].

TYPE LOCALITY: "Eocene"—Matthew's Landing and Gregg's Landing, Alabama (Aldrich, 1895:62).

REMARKS: Not a *Busycon;* may be referred to *Perissolax eocensis* (Aldrich, 1895).

*epispiniger* [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 454, pl. 50, fig. 6.

TYPE LOCALITY: Lower Miocene—Chipola formation, Alum Bluff group: Tenmile Creek, 1 mile west of Bailey's Ferry, Calhoun County, Florida (Gardner, 1944:454).

REMARKS: Gardner (1944:454) restricted *spiniger* Conrad (1848) to the Oligocene (Vicksburg), considering it to be an analogy of *epispiniger* Gardner (1944). Gardner stated that *epispiniger* = *Fulgur spiniger* Dall [in part], 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 109, not *spiniger* Conrad (1848).

*exactum* [*Busycon*] "Conrad" Olsson and Harbison, 1953, Acad. Nat. Sci. Phila., Monogr. no. 8, p. 212, pl. 34, fig. 6 as *excavatum* Conrad.

OCCURRENCE: Upper Miocene—Duplin marl: Natural Well, Duplin County, North Carolina (Olsson and Harbison, 1953:212).

REMARKS: Error for/or emendation of *excavatus* Conrad (1840).

*excavatus* [*Fulgur*] Conrad, 1840, Am. Jour. Sci., ser. 2, vol. 39, p. 387; 1861, Fossils Med. Tert. U. S., no. 4, p. 82, pl. 45, fig. 12 [as *Busycon*]; Gill, 1867, Am. Jour. Conch., vol. 3, p. 150 [as *Sycotypus*]; Conrad, 1868, Am. Jour. Conch., vol. 3, p. 267, pl. 23, fig. 6 [as *Sycotypus*];

Dall, 1890, Trans Wagner Free Inst. Sci., vol. 3, pt. 1, p. 112 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 522, fig. 5 [as *Sycotypus*].

TYPE LOCALITY: Upper Miocene—Duplin marl: Natural Well, Duplin County, North Carolina (Conrad, 1840:387) and (Conrad, 1861:82).

OCCURRENCE: Miocene—Maryland, Virginia, and North Carolina (Dall, 1890:112). Pliocene—South Carolina and Florida (Dall, 1890: 112).

REMARKS: Dall (1890:112) considered *excavatus* Conrad (1840) a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

JUNIOR SYNONYMS: *carolinensis* Tuomey and Holmes (1857)
*elongatus* Gill (1867).

**ficus* [*Sycotypus*] Gray [*ex* Adams MS], 1847, Proc. Zool. Soc. London, pt. 15, p. 135; 1850, Figs. Moll. Anim., vol. 3, pl. 261, fig. 4, vol. 4, p. 68.

TYPE LOCALITY: Recent—not given.

REMARKS: Not a *Busycon;* may be referred to *Bulla fide* Sherborn (1926:2378).

*filosum* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 286; 1868, Am. Jour. Conch., vol. 3, p. 266, pl. 21, fig. 7 [as *Busycon*].

TYPE LOCALITY: Upper Miocene—Yorktown formation: York County, Virginia (Conrad, 1863:286).

JUNIOR SYNONYM: ? *obfilosum* Grabau (1903)

*floridanum* [*Busycon*] Olsson and Harbison, 1953, Acad. Nat. Sci. Phila., Monogr. no. 8, pp. 211-212, pl. 34, figs. 2, 2a, 2b, 2c.

TYPE LOCALITY: Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida [dredge dumps] (Olsson and Harbison, 1953:212).

REMARKS: Olsson and Harbison (1953:211) described *floridanum* as a subspecies of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816).

*foerstei* [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 452, pl. 49, figs. 19,20.

TYPE LOCALITY: Middle Miocene—Oak Grove sand, Alum Bluff group: Gastropod Gulch, 5½ miles southeast of Bainbridge, Decatur County, Georgia (Gardner, 1944:452).

*fusiformis* [*Fulgur*] Conrad, 1840, Fossils Med. Tert. U. S., no. 2, cover p. 4; 1842, Proc. Nat. Instn. Prom. Sci., Bull. 2, p 187 [as *Fulgur*]; 1861, Fossils Med. Tert. U. S., no. 4, p 82, pl. 46, fig. 3 [as *Busycon*]; 1868, Am. Jour. Conch., vol. 3, p. 267, pl. 23, fig. 4 [as *Busycon*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 528, fig. 10 [as *Fulgur*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 178-179, pl. 45, figs. 2, 3a, 3b [as *Fulgur*].

TYPE LOCALITY: Miocene—St. Marys formation: Patuxent River, St. Marys County, Maryland (Conrad, 1854:318) and (Conrad, 1861: 82).

OCCURRENCE: Miocene—Maryland and Virginia (Dall, 1890:117). St. Marys formation: St. Marys River, St. Marys County, Maryland; Cove Point, Calvert County, Maryland (Martin, 1904:178-179). Middle Miocene—Shoal River formation ?, Alum Bluff group: "in a bed

which overlies the Chipola [formation = Lower Miocene] and having an outcrop in a mill-race two miles east of Argyle, [Walton County] Florida'' (Johnson, 1903:74).

*gibbosum* [*Fulgur*] Conrad, 1854, Proc. Acad. Nat. Sci. Phila., vol. 6, p. 319; 1863, Proc. Acad. Nat. Sci. Phila, vol 14, p. 286 [as *Busycon*, in text of *filosum*].

TYPE LOCALITY: Recent—''It is not known to inhabit the coast of the United States, and is probably from Campeachy [Campeche] Bay.'' (Conrad, 1854:319).

REMARKS: Dall (1890:116) referred *gibbosum* Conrad (1854) to *perversus* Linné (1758); in light of present information it is difficult to ascertain whether the species represents *perversus* Linné (1758) or *contrarius* Conrad (1840).

*granulata* [*Volema*] Link, 1807, Besch. der Nat.-Samml. Univ. Rostock, pt. 3, p. 116; Mörch, 1852, Cat. Conch. Yoldi, vol. 1, p. 104 [as *Busycum*].

TYPE LOCALITY: not given.

REMARKS: Mörch (1852:104) and Tomlin and Winckworth (1936: 36) considered *granulata* Link (1807) a junior synonym of *canaliculatus* Linné (1758).

*granum* [*Murex*] Linné, 1758, Syst. Nat., ed. 10, vol. 1, p. 752; 1767, ed. 12, vol 1, pt. 2, p. 1222 [as *Murex*]; Say, 1822, Jour. Acad. Nat. Sci. Phila., ser. 1, vol. 2, p. 238 [as *Fulgur*].

TYPE LOCALITY: Recent—Mediterranean Sea (Linné, 1758:752).
Recent—Canada (Linné, 1767:1222).

REMARKS: Linné (1767:1222) described *granum* Linné (1758) as a variety of *canaliculatus* Linné (1758).

**idoleum* [*Busycon*] Jonas, H. Adams and A. Adams, 1853, Gen. Recent Moll., vol. 1, p. 151.

TYPE LOCALITY: Recent — ? China (Jonas, 1846:120).

REMARKS: Not a *Busycon*. Originally described as *Pyrula idoleum* Jonas, 1846, Proc. Zool. Soc. London, pt. 14, pp. 120-121; may be referred to ''*Pyrula idoleum*'' *fide* Tryon (1881:252).

*incile* [*Fulgur*] Conrad, 1833, Am. Jour. Sci., ser. 1, vol. 23, p. 343; Gill, 1867, Am. Jour. Conch., vol. 3, p. 149 [as *Sycotypus*]; Dall [in part, *fide* Gardner (1948:241-242)], 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 112 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 523, text fig. [as *Sycotypus*]; Smith, B., 1914, Proc. Acad. Nat. Sci. Phila., vol. 66, pp. 570, 574, pl. 24, figs. 4, 4a [as *Fulgur*]; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, pp. 241-242 [as *Busycon*].

TYPE LOCALITY: Upper Miocene—Yorktown formation: Yorktown, York County, Virginia (Conrad, 1833:343) and (Gardner, 1948: 241-242).

OCCURRENCE: Lower Miocene—Chipola formation: Bailey's Ferry, several miles west of Alum Bluff, Chipola River, Calhoun County, Florida (Maury, 1902, Bull. Am. Paleo., vol. 3, no. 15, p. 371). Miocene—Maryland, Virginia, North Carolina, South Carolina, and Florida (Dall, 1890:112). Yellow marl, Burwell Bay, James River, Virginia (Smith, B., 1914:570. Upper Miocene—Yorktown formation: Fergusons Wharf, Isle of Wight County, Virginia; ¼ to ½ mile below

Suffolk Waterworks dam, Nansemond County, Virginia; 6 miles below Greenville at Cherry Landing on Tar River, Pitt County, North Carolina (Gardner, 1948:241-242). Pleistocene—shell ridge at Grand Chenier, Cameron Parish, Louisiana (Richards, 1939a:307, 313).

REMARKS: Dall (1890:112) stated that *incile* Conrad (1833) is a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)] and further that *incile* = *Busycon canaliculatum* Tuomey and Holmes [in part], 1857, Pleioc. fossils So. Car., p. 146, pl. 29, fig. 2, not *canaliculatus* Linné (1758). Gardner (1948:242) considered all authentic records of *incile* Conrad (1833) to be restricted to Virginia, but lists on the same page the occurrence of *incile* in North Carolina.

JUNIOR SYNONYMS:

? *conradi* Tuomey and Holmes (1857)
? *canaliferum* Conrad (1863) = *carolinensis* Emmons (1858)
*alveatum* Conrad (1863)

*inversum* [*Busycon*] 'Bolten' Röding, 1798, Mus. Boltenianum, pt. 2, p. 149 [*nomen nudum*]; Smith, B., 1939, Nautilus, vol. 52, no. 1, p. 17.

*kerrii* [*Busycon*] Conrad, 1875, [in] Kerr, No. Car. Geol. Surv. Rept., vol. 1, App. A, p. 23, pl. 4, fig. 2.

TYPE LOCALITY: Pliocene—Waccamaw formation ?: "James King's marl pit, Sampson County," North Carolina (Conrad, 1875: 23).

*kieneri* [*Pyrula*] Philippi, 1848, Zeitsch. Malak., p .98.

TYPE LOCALITY: Recent—Antillean Ocean [Caribbean Sea] and Campeche Bay (Kiener, 1840:8).

REMARKS: Philippi (1848:98) referred to *Pyrula perversa* var. Kiener, 1840, Spéc. Gén. Icon. Coquil. Viv., vol. 6 [Famille de Canaliferes, pt. 2], pp. 7, 8, pl. 9, fig. 2. B. Smith (1939:26) considered *kieneri* Philippi (1848) a junior synonym of *perversus* Linné (1758).

RÉSUMÉ: *perversus* Linné (1758) = *kieneri* Philippi (1848) = ? *gibbosum* Conrad (1854).

*libertiensis* [*Busycon*] Mansfield, 1930, Bull. Florida Geol. Surv., no. 3, p. 68, pl. 10, fig. 3.

TYPE LOCALITY: Upper Miocene—Choctawhatcheee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Mansfield, 1930:68).

REMARKS: Mansfield (1930:68) described *libertiensis* as a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)] and based his species on two imperfect specimens from the type locality. Mansfield considered *libertiensis* to = *incile* Dall, 1903, Trans. Wagner Free Inst. Sci., vol. 3, pt. 6, p. 1596, not *incile* Conrad (1833).

*maximus* [*Fulgur*] Conrad, 1839, Fossils Med. Tert. U. S., no. 1, cover p. 3; 1861, Fossils Med. Tert, U. S., no. 4, p. 83, pl. 47, fig. 1 [as *Busycon*]; 1867, Am. Jour. Conch., vol. 3, p. 184 [as *Busycon*] Dall [in part, *fide* Mansfield, 1930:66], 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 115 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 529, fig. 13 [as *Fulgur*].

TYPE LOCALITY: Upper Miocene—Yorktown formation: Yorktown, York County, Virginia (Conrad, 1854:318).

OCCURRENCE: Upper Miocene—Duplin marl: Duplin County, North Carolina; Wilmington, New Hanover County, North Carolina (Dall, 1890:115 [*maximus sensu lato*]). Choctawhatchee formation: upper bed at Alum Bluff, Liberty County, Florida (Dall, 1890:115). Pliocene ?—Darlington, Darlington County, South Carolina (Dall, 1890: 115 [*maximus sensu lato*]). Pliocene—Caloosahatchee formation: on the Caloosahatchee River, Lee County, Florida (Dall, 1890:115 [*maximus sensu lato*]).

VARIETIES: *rapum* Heilprin (1887) = *obrapum* Grabau (1903)
? *tudiculatum* Dall (1890)
*alumense* Mansfield (1930)

**modestus* [*Sycotypus*] Conrad, 1865, Am. Jour. Conch., vol. 1, p. 151.

TYPE LOCALITY: Miocene ? ["Tertiary"]—Astoria, Clatsop County, Oregon (Conrad, 1848:433).

REMARKS: Not a *Busycon*. Originally described as *Pyrula modesta* Conrad, 1848, Am. Jour. Sci., ser. 2, vol. 5, p. 433, fig. 12; may be referred to *Ficus modestus* (Conrad, 1848).

*montforti* [*Busycon*] Aldrich, 1907, Nautilus, vol. 20, no. 11, p. 121, pl. 6, 2 figs.; Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, pp. 453-454, pl. 50, figs. 1, 2 [as *Busycon*].

TYPE LOCALITY: Middle Miocene—Shoal River formation, Alum Bluff group: Shoal River, Walton County, Florida (Aldrich, 1907: 121) and (Gardner, 1944:453-454).

OCCURRENCE: Middle Miocene—Shoal River formation, Alum Bluff group: 6 miles west-northwest of Mossyhead, Walton County, Florida; Shell Bluff, Walton County, Florida (Gardner, 1944:453-454).

*muricatum* [*Busycon*] 'Bolten' Röding, 1798, Mus. Boltenianum, pt. 2, p. 149.

TYPE LOCALITY: Recent—not given.

REMARKS: 'Bolten' Röding (1798:149) cited *carica* Gmelin (1790) as a reference for their species *muricatum;* this species is a junior synonym of *carica* Gmelin (1790).

RÉSUMÉ: *aruanus* Linné (1758) [in part] = *carica* Gmelin (1790) = *muricatum* 'Bolten' Röding (1798) = *spinosum* Conrad (1863).

*nodulatum* [*Fulgur*] Conrad, 1849, Jour. Acad. Nat. Sci. Phila., ser. 2, vol. 1, p. 207; 1850, vol. 2, pl. 1, fig. 7 [not fig. 6]; 1854, Proc. Acad. Nat. Sci. Phila., vol. 6, p 317 [as *Fulgur*].

TYPE LOCALITY: Oligocene ["Upper Eocene"]—Vicksburg, Warren County, Mississippi (Conrad, 1849:207).

REMARKS: Gardner (1944:454-455) believed Dall's (1890) *spiniger nodulatum* to be a new species [see *sicyoides* Gardner (1944)] and retained *nodulatum* Conrad (1849) as a distinct species [see also *ballastense* Mansfield (1937)]. Gardner (1944:456) restricted the concept of *nodulatum* Conrad (1849) to Conrad's (1850) fig. 7 [not fig. 6] which agrees with the original description of the species.

*obfilosum* [*Fulgur*] Grabau, 1903, Am. Natural., vol. 37, no. 440, pp. 533-534.

TYPE LOCALITY: Upper Miocene ?—Duplin marl ?: "marls of Cape Fear River, North Carolina." (Grabau, 1903:533-534).

REMARKS: Grabau, (1903:533-534) believed *obfilosum* to be a dis-

tinct species, but stated that it might represent a reversed condition of *filosum* Conrad (1863).

*obrapum* [*Fulgur*] Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 533.
TYPE LOCALITY: Upper Miocene and Pliocene ?—vague, Duplin marl and Caloosahatchee formation ? (Grabau, 1903:533).
REMARKS: Grabau (1903:533) considered *obrapum* a sinistral version of *rapum* Heilprin (1887).

**ocoyanus* [*Sycotopus* (*sic*)] Conrad, 1855, U. S. House of Representatives Doc. no. 129, p. 19; 1857, Pacific R.R. Repts., vol. 5, pl. 7, figs. 72, 72a [as *Sycotopus* (*sic*)].
TYPE LOCALITY: Miocene—Temblor formation: Ocoya [=Posa] Creek, near Baker's Ranch, Kern County, California (Conrad, 1855: 19).
REMARKS: Not a *Busycon;* may be referred to *Ficus* (*Trophosycon*) *ocoyana* (Conrad, 1855). Conrad's (1855) *ocoyana* is the type species of *Trophosycon* Cooper, 1894.

*onslowensis* [*Busycon*] Kellum, 1926, U. S. Geol. Surv., Prof. Paper 143, p. 40, pl. 11, figs. 1-3; Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, pp. 17, 18 [as *Busycon*].
TYPE LOCALITY: Lower Miocene—Trent marl: Silverdale, Onslow County, North Carolina (Kellum, 1926:40).
REMARKS: Kellum (1926:40) described *onslowensis* as a variety of *spiniger* Conrad (1848).

**oregonensis* [*Fulgur*] Conrad, 1854, Proc. Acad. Nat. Sci. Phila., vol. 6, pp. 318-319; 1865, Am. Jour. Conch., vol. 1, p. 151 [as *Sycotyphus* (*sic*)], not *Priscofusus oregonensis* Conrad, 1865.
TYPE LOCALITY: Miocene—Columbia River, near Astoria, Clatsop County, Oregon (Conrad, 1854: 319).
REMARKS: Not a *Busycon.* Originally described as *Fusus oregonensis* Conrad, 1848, Am. Jour. Sci., ser. 2, vol. 5, p. 433, fig. 13; may be referred to *Ficus* (*Trophosycon*) *oregonensis* (Conrad, 1848).

*perizonatum* [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 111; Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, pp. 119-120, pl. 4, figs. 8, 9 [as *Busycon*].
TYPE LOCALITY: Lower Miocene—Tampa limestone: "silex beds" at Ballast Point, Tampa Bay, Hillsborough County, Florida (Dall, 1890:111) and (Mansfield, 1937:120)
OCCURRENCE: Lower Miocene—Tampa limestone: Sixmile Creek near Orient Station, Hillsborough County, Florida; ? Stations 7358 and 12763, Anclote River at Tarpon Springs, Pinellas County, Florida (Mansfield, 1937:120, table 1).
REMARKS: Dall (1890:111) described *perizonatum* as a variety of *spiniger* Conrad (1848).

*perversus* [*Murex*] Linné, 1758, Syst. Nat., ed. 10, vol. 1, p. 753; 1767 ed. 12, vol. 1, pt. 2, p. 1222 [as *Murex*].
TYPE LOCALITY: Recent—American Ocean (Linné, 1758:753).
OCCURRENCE: Miocene—North Carolina and South Carolina (Dall, 1890:116). Upper Miocene — Choctawhatchee formation: Harvey's Creek and Jackson Bluff, Leon County, Florida (Mansfield, 1930:69). Pliocene—South Carolina; Caloosahatchee formation: SW Florida (Dall, 1890:116). Croatan sand: North Carolina (Mansfield, 1936,

Jour. Paleo., vol. 10, no. 7, p. 666). "Post-Pliocene"—North Carolina, South Carolina, and Florida (Myakka River) (Dall, 1890:116). Pleistocene—Eau Gallie, Brevard County, Florida; Vero Beach, dredgings from canal west of spillway, Indian River County, Florida; Dredgings from Fort Pierce Harbor, St. Lucie County, Florida; Dredgings from West Palm Beach Canal, 5 miles west of West Palm Beach, Palm Beach County, Florida; Torch Key, Monroe County, Florida; North Creek, near Osprey, Sarasota County, Florida; ⅛ mile south of Manatee Station, Manatee County, Florida; Gandy Bridge fill between Tampa and St. Petersburg, Hillsborough County, Florida; Six-mile Creek, Orient Station, Hillsborough County, Florida; Drainage ditch near Pinellas Park, Pinellas County, Florida; Fill at Spa Beach, St. Petersburg, Pinellas County, Florida (Richards, 1938:1288, 1289, 1290, 1293). Lake Borgne borings between Lake Borgne and Mississippi River, St. Tammany Parish, Louisiana; New Orleans Pumping Station no. 7, Orleans Parish, Louisiana (Richards, 1939a:305, 313). Dredgings from the Intra-Coastal Canal about 6 miles east of the Galveston-Point Bolivar Ferry, Galveston County, Texas; Cottage Haven Well, half a mile south of Rockport, ⅛ mile from Aransas Bay, maximum depth 44 feet, Aransas County, Texas (Richards, 1939b: 1889, 1891, 1896). Post-Pleistocene—Chenier au Tigre, Vermillion Parish, Louisiana; shell ridge at Grand Chenier, Cameron Parish, Louisiana; Dredgings from canal near Cameron Meadows Oil Feld, Cameron Parish, Louisiana (Richards, 1939a:306, 307, 313). Recent—Cape Hatteras, North Carolina to the Gulf of Mexico (Dall, 1890:116). Progreso, Yucatan; Campeche, Campeche; between Chenkan and Sabancuy, Campeche, Mexico (Weisbord, 1926:85).

REMARKS: B. Smith (1939:23) stated that after examining a photograph of the type that the name *perversus* Linné (1758) should be applied to the robust form *kierneri* Philippi (1848), and that the elongate form, which is generally referred to as *contrarius* Conrad (1840), is a valid species and not a junior synonym of *perversus* Linné (1758). In the light of present information it is difficult to ascertain whether the above listed occurrences refer to *perversus* Linné (1758) or *contrarius* Conrad (1840); for this reason the locality data, quoted from various authors, is questionably placed under *perversus* Linné (1758) and should be considered to represent *perversus* Linné "*sensu lato.*"

JUNIOR SYNONYMS: *kieneri* Philippi (1848)
? *gibbosum* Conrad (1854)

*plagosum* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 583.

TYPE LOCALITY: Recent—"New Jersey ?" (Conrad, 1863:583).

REMARKS: Conrad (1863:583) stated that *plagosum* is allied to *pyrum* Dillwyn (1817); Gill (1867:150), Tryon (1881:143), and Dall 1890:112) considered *plagosum* Conrad (1863) a junior synonym of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

RÉSUMÉ: *spirata* Lamarck (1816) = *pyrum* Dillwyn (1817) = *pyruloides* Say (1822) = *plagosum* Conrad (1863) = *elegans* Conrad (1863) = *pyriformis* Conrad (1867).

*planulatum* [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 114.

TYPE LOCALITY: Pliocene—Caloosahatchee formation: Shell Creek, Caloosahatchee River, Lee County, Florida (Dall, 1890:114).

OCCURRENCE: Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida; Fort Thompson, Hendry County, Florida (Olsson and Harbison, 1953:211).

REMARKS: Dall (1890:114) considered *planulatum* a questionable variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

*propecoronatum* [*Busycon*] Mansfield, 1935, Florida Geol. Surv., Bull. no. 12, p. 32, pl. 3, figs. 1, 2.

TYPE LOCALITY: upper Middle Miocene—Choctawhatchee formation [*Arca* zone (upper part)]: Station 12046, upper locality, Vaughan Creek, Walton County, Florida (Mansfield, 1935:32).

REMARKS: Mansfield (1935:32) considered *propecoronatum* to be closely related to *coronatum* Conrad (1840).

*propeincile* [*Busycon*] Mansfield, 1930, Florida Geol. Surv., Bull. no. 3, p. 68, pl. 9, fig. 5.

TYPE LOCALITY: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Mansfield, 1930:68).

REMARKS: Mansfield (1930:68) considered *propeincile* a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)]; one specimen is known to exist.

*proterum* [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 457, pl. 50, fig. 5.

TYPE LOCALITY: Miocene—Roseland Plantation, 3½ miles southeast of Bainbridge, Decatur County, Georgia (Gardner, 1944:457).

OCCURRENCE: Middle Miocene—Oak Grove sand, Alum Bluff group: Florida (Gardner, 1944:457).

REMARKS: Gardner (1944:457) stated that *proterum* is one of the earliest known representatives of the subgenus *Sycotypus*.

*pyriformis* [*Sycotypus*] Conrad, 1867, Am. Jour. Conch., vol. 3, p. 186; 1868, vol. 3, p. 265, pl. 20, fig. 1; Heilprin, 1887, Trans. Wagner Free Inst. Sci., vol. 1, p. 74 [as *Fulgur*].

TYPE LOCALITY: Upper Miocene—Duplin marl ?: Natural Well, Duplin County ["Dauphin County"], North Carolina (Conrad 1867: 186).

OCCURRENCE: Pliocene—"Floridian formation" [= ? Caloosahatchee formation]: banks of the Caloosahatchee River, below Fort Thompson, [Lee County ?], Florida (Heilprin, 1887:74).

REMARKS: Dall (1890:112) considered *pyriformis* Conrad (1867) a junior synonym of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

*pyruloides* [*Fulgur*] Say, 1822, Jour. Acad. Nat. Sci. Phila., ser. 1, vol. 2, pp. 237-238; 1831, Am. Conch., *Fulgur*, pl. 19.

TYPE LOCALITY: Recent—"inhabits the Southern coast" (Say, 1822:237).

REMARKS: Say (1822:237-238) believed that *pyruloides* might be synonymous with *pyrum* Dillwyn (1817); Say (1831: pl. 19) and Gill

(1867:150) considered *pyruloides* Say (1822) a junior synonym of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].
RÉSUMÉ: *spirata* Lamarck (1816) = *pyrum* Dillwyn (1817) = *pyruloides* Say (1822) = *plagosum* Conrad (1863) = *elegans* Conrad (1863) = *pyriformis* Conrad (1867).

*pyrum* [*Bulla*] Dillwyn, 1817, Descript. Cat. Recent Shells, vol. 1, p. 485; Gill, 1867, Am. Jour. Conch., vol. 3, p. 150 [as *Sycotypus*]; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 112 [as *Fulgur*].
TYPE LOCALITY: Recent—not given.
REMARKS: A junior synonym of *spirata* Lamarck (1816).
RÉSUMÉ: *spirata* Lamarck (1816) = *pyrum* Dillwyn (1817) = *pyruloides* Say (1822) = *plagosum* Conrad (1863) = *elegans* Conrad (1863) = *pyriformis* Conrad (1867).

*radix* [*Busycon*] Dall, 1903, Trans. Wagner Free Inst. Sci., vol. 3, pt. 6, p. 1590 [*nomen nudum*].
REMARKS: See remarks under *radix* Gardner (1944).

*radix* [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, pp. 452-453, pl. 49, figs. 17, 18.
TYPE LOCALITY: Middle Miocene—Oak Grove sand, Alum Bluff group: Yellow River, Okaloosa County, Florida (Gardner, 1944:452-453).
OCCURRENCE: Middle Miocene — Oak Grove sand, Alum Bluff group: "?" Old Senterfeit mill, 4½ miles southwest of Laurel Hill, Walton County, Florida (Gardner, 1944:452-453).
REMARKS: Gardner (1944:452-453) listed *radix* Dall (1903), a *nomen nudum*, in the synonymy of *radix* Gardner (1944).

*rapum* [*Fulgur*] Heilprin, 1887, Trans. Wagner Free Inst. Sci., vol. 1, p. 71, pl. 2, fig. 4; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 115 [*as Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 531, fig. 15 [as *Fulgur*].
TYPE LOCALITY: Pliocene—"Floridian formation" [= Caloosahatchee formation ?]: in the banks of the Caloosahatchee River, below Fort Thompson, [Lee County ?], Florida (Heilprin, 1887:71).
OCCURRENCE: Miocene—Florida (Mansfield, 1930:67). Upper Miocene—Choctawhatchee formation: Harvey's Creek, ½ mile above abandoned mill, Leon County, Florida (Mansfield, 1930:57). Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida [dredge dumps] (Olsson and Harbison, 1953:210).
REMARKS: Dall (1890:115) considered *rapum* Heilprin (1887) a variety of *maximus* Conrad (1839).
JUNIOR SYNONYM: *obrapum* Grabau (1903) [sinistral version]
VARIETIES: *tritonoides* Grabau (1903)

**reticulata* [*Sycotypus*] Gray [*ex* Adams MS], 1850, Figs. Moll. Anim., vol. 3, pl. 261, fig. 5, vol. 4, p. 68.
TYPE LOCALITY: Recent—not given.
REMARKS: Not a *Busycon;* may be referred to *Ficula fide* Sherborn (1930: 5483)

**reticulata* [*Sycotypus*] Lamarck, Tuomey and Holmes, 1857, Pleioc. fossils So. Car., p. 149, pl. 30, fig. 3; Emmons, 1858, No. Car. Geol. Surv. Rept., p. 250, fig. 109 [as *Sycotypus*].
TYPE LOCALITY: Recent—Indian Ocean (Lamarck, 1822:141).

REMARKS: Not a *Busycon*. Originally described as *Pyrula reticulata* Lamarck, 1822, Hist. Nat. An. s. Vert., vol. 7, p. 141; may be referred to *Ficus papyratius* (Say, 1822).

*robesonense* [*Busycon*] Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 239, pl. 35, figs. 1, 3.

TYPE LOCALITY: Upper Miocene—Duplin marl: 4 miles north of Lumberton, Robeson County, North Carolina (Gardner, 1948:239).

OCCURRENCE: Upper Miocene—Duplin marl: 2 miles below Lumberton, at Fairmont (Ashpole), Robeson County, North Carolina; 1½ miles northeast of Fairmont, Robeson County, North Carolina (Gardner, 1948:239).

*rugosus* [*Fulgur*] Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. 1, pp. 307-308; 1861, Fossils Med. Tert. U. S., no. 4, pp. 82-83, pl. 46, fig. 4 [as *Busycon*]; 1868, Am. Jour. Conch., vol. 3, p. 267, pl. 24, fig. 4 [as *Sycotypus*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 525, fig. 9 [as *Sycotypus*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 181, 182, pl. 46, figs. 2a, 2b [as *Fulgur*].

TYPE LOCALITY: Miocene—St. Marys formation: St. Mary's River, St. Marys County, Maryland (Conrad, 1843:307-308).

OCCURRENCE: Middle Miocene—Calvert formation: Plum Point, Maryland; Choptank formation: Jones Wharf, Greensboro, Caroline County, Maryland (Martin, 1904:181, 182). Miocene—St. Mary's formation: Cove Point, Calvert County, Maryland (Martin, 1904:181, 182).

**rusticulata* [*Busycum*] De Basterot, Mörch, 1852, Cat. Conch. Yoldi, vol 1, p. 104.

TYPE LOCALITY: fossil only—Burdigala (Mörch, 1852: 104).

REMARKS; Not a *Busycon*. Originally described as *Pyrula rusticulata* De Basterot, 1825, Mém. Soc. Hist. Nat. Paris, vol. 2, pt. 1, p. 68 [not seen]; may be referred to *Tudicla rusticulata* (De Basterot, 1825).

*scalaris* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 561 [*nomen nudum*].

*scalarispira* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 561, 584; [?] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 111-112 [as *Fulgur*].

TYPE LOCALITY: Middle Miocene—Shiloh marl member, Kirkwood sand: Shiloh, Cumberland County, New Jersey (Conrad, 1863:584) and (Mansfield, 1930:67).

OCCURRENCE: Upper Miocene—Choctawhatchee formation: upper bed at Alum Bluff, Liberty County, Florida (Dall, 1890:111-112).

REMARKS: Mansfield (1930:67, 68) questioned whether *scalarispira* Conrad (1863) and *scalarispira* Dall (1890) are identical.

*sicyoides* [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, pp. 454-456, pl. 50, figs. 7, 8.

TYPE LOCALITY: Lower Miocene—Chipola formation, Alum Bluff group: 1 mile below Bailey's Ferry, Chipola River, Calhoun County, Florida (Gardner, 1944:454-456).

OCCURRENCE: Lower Miocene — Chipola formation, Alum Bluff group: Boynton Landing, Choctawhatcee River, Washington County,

Florida; Tenmile Creek, 1 mile west of Bailey's Ferry, Calhoun County, Florida (Gardner, 1944:454-456).

REMARKS: Gardner (1944:454-456) stated that *sicyoides* = *Fulgur spiniger* var. *nodulatum* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 110 [in part, synonymy excluded], not *nodulatum* Conrad (1849); see *ballastense* Mansfield (1937).

*spiniger* [*Fusus*] Conrad, 1848, Proc. Acad. Nat. Sci. Phila., vol. 3, p. 286; 1848, Jour. Acad. Nat. Sci. Phila., ser. 2, vol. 1, p. 117, pl. 11, fig. 32; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 109-111 [as *Fulgur*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 177-178, pl. 45, figs. 1a, 1b [as *Fulgur*]; Gardner, 1945, Mem. Geol. Soc. Am., no. 11, p. 206 [as *Busycon*].

TYPE LOCALITY: Oligocene—vicinity of Vicksburg, Warren County, Mississippi (Conrad, 1848:286). Lower Oligocene—Red Bluff formation: Vicksburg, Warren County, Mississippi (Mansfield, 1937:18).

OCCURRENCE: Oligocene—at base of the upper Middle Oligocene sandstone, in the ashy bed on the east slope of a hill on an old road which crosses Miralejas-Cojta road 1829 meters south of Rancho Miralejas, Carlos Cantú, China, Neuvo Léon, Mexico (Gardner, 1945: 206). Lower Miocene—Chipola formation, Alum Bluff group: near the Chipola River, west Florida (Dall, 1890:109-111). Calvert formation: Plum Point, Maryland; Choptank formation: Jones Wharf, Greensboro, Caroline County, Maryland (Martin, 1904:177-178).

JUNIOR SYNONYMS: *striatum* Conrad (1863)
*dumosum* Conrad (1868)

VARIETIES: ? *burnsii* Dall (1890)
*perizonatum* Dall (1890)
*tampaensis* Dall (1890) and var. *ballastense* Mansfield (1937)
*onslowensis* Kellum (1926)

*spinosum* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 583; 1867, Am. Jour. Conch., vol. 3, pp. 184-185 [as *Busycon*].

TYPE LOCALITY: Recent—Coasts of the United States (Conrad, 1863:583).

REMARKS: Conrad (1863:583) stated that *spinosum* had been confused with *carica* Gmelin (1790) by several authors; Gill (1867:145) considered *spinosum* Conrad (1863) a junior synonym of *carica* Gmelin (1790).

RÉSUMÉ: *aruanus* Linné (1758) [in part] = *carica* Gmelin (1790) = *muricatum* 'Bolten' Röding (1798) = *spinosum* Conrad (1863).

*spirata* [*Pyrula*] Lamarck, 1816, Encyclop. Méth., vol. 4, pl. 433, figs. 2a, 2b, Liste, p. 8; 1822, Hist. Nat. An. s. Vert., vol. 7, p. 142; Reeve, 1847, Conch. Icon., vol. 4, *Pyrula*, pl. 8, fig. 27.

TYPE LOCALITY: Recent—not given.

OCCURRENCE: Upper Miocene to Recent (Dall, 1890:112). Pliocene —Godfrey's Ferry, Pee Dee River, Horry County, South Carolina (Tuomey and Holmes, 1857:xi, 148). Caloosahatchee formation ?: Caloosahatchee River, Lee County ?, Florida (Smith, B., 1914:570). "Post-Pliocene"—Simmons' Bluff, Yonge's Island, Charleston County, South Carolina (Holmes, 1860: acknowledgements, 67 [one speci-

men]). Pleistocene—Cornfield Harbor, Maryland (Smith, B., 1914: 570). Goodno's Landing, on Caloosahatchee River, Hendry County, Florida; North Creek, near Osprey, Sarasota County, Florida; ⅛ mile south of Manatee Station, Manatee County, Florida; Gandy Bridge fill between Tampa and St. Petersburg, Hillsborough County, Florida; Sixmile Creek, Orient Station, Hillsborough County, Florida; Dredgings from Intra-Coastal Canal, Palm Valley, St. John's County, Florida; Fill along east side of Halifax River, one mile north of Ormond Beach, Volusia County, Florida; Eau Gallie, Brevard County, Florida (Richards, 1938:1288, 1289, 1293). Grand Chenier, Cameron Parish, Louisiana; New Orleans Pumping Station no. 7, Orleans Parish, Louisiana (Maury, 1922:55). Recent—North Carolina to Florida and Texas (Johnson, 1934:126). Gulf of Campeche, Mexico (Univ. Calif. Mus. Paleo. loc. A-7560).

REMARKS: The above occurrences and the following synonyms and varieties were originally listed as *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

JUNIOR SYNONYMS: *pyrum Dillwyn* (1817)
*pyruloides* Say (1822)
*plagosum* Conrad (1863)
*elegans* Conrad (1863)
*pyriformis* Conrad (1867)

VARIETIES: ? *incile* Conrad (1833) = ? *conradi* Tuomey and Holmes (1857)
= ? *canaliferum* Conrad (1863)
= *alveatum* Conrad (1863)
*excavatus* Conrad (1840) = *carolinensis* Tuomey and Holmes (1857)
= *elongatus* Gill (1867)
*aepynotum* Dall (1890)
? *planulatum* Dall (1890)
*libertiensis* Mansfield (1930)
*propeincile* Mansfield (1930)
*floridanum* Olsson and Harbison (1953)

**spirillus* [*Busycum*] Linné, Mörch, 1852, Cat. Conch. Yoldi, vol. 1, p. 104.

TYPE LOCALITY: Recent—Tranquebar, Madras, India (Linné, 1767: 1221).

REMARKS: Not a *Busycon*. Originally described as *Murex spirillus* Linné, 1767, Syst. Nat., ed. 12, vol. 1, pt. 2, p. 1221; may be referred to *Tudicla spirilla* (Linné, 1767).

*stellatum* [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 114-115, pl. 4, fig. 9; Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, pp. 120-121 [as *Busycon*].

TYPE LOCALITY: Lower Miocene—Tampa limestone: "Silex beds" at Ballast Point, Tampa Bay, Hillsborough County, Florida (Dall, 1890:114-115).

OCCURRENCE: Lower Miocene—Tampa limestone: "?" Sixmile Creek, near Orient Station, Hillsborough County, Florida (Mansfield, 1937:121).

**striata* [*Fulgur*] Savigny [? Gray], Tryon, 1881, Man. Conch., vol. 3, p. 143, pl. 58, fig. 404.
TYPE LOCALITY: Recent—not given.
REMARKS: Not a *Busycon*. Originally described as *Pyrula striata* Savigny [? Gray], 1834, [in Griffith and Pidgeon, Curvier's Animal Kingdom, vol. 12, Mollusca and Radiata, p. 599, pl. 37, fig. 4; may be referred to *Taphon striata* (Savigny, 1834), *striata* is the monotype of the genus *Taphon*. Tryon (1881:143) credited *striata* to "Gray" in Griffith's Cuvier; Sherborn, 1922, Index Animalium, vol. 2, pt. 1, p. lxii, stated that Gray's manuscript was never published. The citation in "Griffith's Cuvier" credits Savigny as being the author of *striata*.

*striatum* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 561, 584; 1866, Am. Jour. Conch., vol. 3, p. 69, pl. 3, fig. 8 [as *Busycon*].
TYPE LOCALITY: Middle Miocene—Shiloh marl member, Kirkwood sand: Shiloh, Cumberland County, New Jersey (Conrad, 1863: 584) and (Mansfield, 1930:67).
OCCURRENCE: "Miocene"—Virginia or Maryland (Conrad, 1866: 69).
REMARKS: Dall (1890:110) and Martin (1904:177-178) considered *striatum* Conrad (1863) a junior synonym of *spiniger* Conrad (1848).
RÉSUMÉ: *spiniger* Conrad (1848) = *striatum* Conrad (1863) = *dumosum* Conrad (1868).

*tampaensis* [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 111; Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, p. 119 [as *Busycon*].
TYPE LOCALITY: Lower Miocene—Tampa limestone: "silex beds" at Ballast Point, Tampa Bay, Hillsborough County, Florida (Dall, 1890:111) and (Mansfield, 1937:119, table 1).
REMARKS: Dall (1890:111) described *tampaensis* as a variety of *spiniger* Conrad (1848).
VARIETIES: *ballastense* Mansfield (1937)

**trabeatus* [*Fulgur*] Conrad, 1854, Proc. Acad. Nat. Sci. Phila., vol. 6, p. 317.
TYPE LOCALITY: "Eocene"—Claiborne, Monroe County, Alabama (Conrad, 1833:29).
REMARKS: Not a *Busycon*. Originally described as *Fusus trabeatus* Conrad, 1833, Fossil Shells Tert. Form. No. Am., ed. 1, vol. 1, no. 3, p. 29; 1835, ed. 2, vol. 1, no. 3, pp. 53, 55, pl. 18, fig. 1; may be referred to *Levifusus trabeatus* (Conrad, 1833).
JUNIOR SYNONYM: *bicarinatus* I. Lea (1833)

**triserialis* [*Fulgur*] Whitfield, 1865, Am. Jour. Conch., vol. 1, p. 260.
TYPE LOCALITY: Oligocene ["Eocene"]—"Lignite Stage": nine miles below Prairie Bluff, Alabama (Whitfield, 1865:260) and (Harris, 1899, Bull. Am. Paleo., vol. 3, no. 11, p. 67).
REMARKS: Not a *Busycon;* may be referred to *Fulguroficus triserialis* (Whitfield, 1865).

*tritonis* [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 561, 583; 1868, Am. Jour. Conch., vol. 3, p. 265, pl. 20, fig. 2

[as *Busycon*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 530, fig. 14 [as *Fulgur*].

TYPE LOCALITY: Upper Miocene—Yorktown formation: Yorktown, York County, Virginia (Conrad, 1863:583).

REMARKS: Dall (1890:115) considered *tritonis* Conrad (1863) an extreme in variation of *maximus rapum* Heilprin (1887).

*tritonoides* [*Fulgur*] Grabau, 1903, Am. Natural., vol. 37, no. 440, pp. 532-533.

TYPE LOCALITY: not given.

REMARKS: Grabau (1903:532-533) considered *tritonoides* a variety of *rapum* Heilprin (1887).

*tuberculatus* [*Fulgur*] Conrad, 1840, Fossils Med. Tert. U. S., no. 2, cover p. 4; 1842, Proc. Nat. Instn. Prom. Sci., Bull. 2, p. 185 [as *Fulgur*]; 1861, Fossils Med. Tert. U. S., no. 4, pl. 46, fig. 2 [as *Busycon*]; Gill, 1867, Am. Jour. Conch., vol. 3, p. 146 [as *Fulgur*]; Conrad, 1868, Am. Jour. Conch., vol. 3, p. 266, pl. 23, fig. 1 [as *Busycon*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 528, fig. 11 [as *Fulgur*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 179-180, pl. 45, figs. 4a, 4b [as *Fulgur*].

TYPE LOCALITY: Miocene—St. Marys formation: Patuxent River, St. Marys County, Maryland (Conrad, 1854:318) and (Conrad, 1861: 82).

OCCURRENCE: Miocene—St. Marys formation: St. Marys River, Cove Point, Calvert County, Maryland (Martin, 1904:179-180).

*tudiculatum* [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 115-116; Mansfield, 1930, Florida Geol. Surv., Bull. no. 3, p. 67, pl. 7, fig. 2 [as *Busycon*].

TYPE LOCALITY: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Dall, 1890:115-116) and (Mansfield, 1930:16).

REMARKS: Dall (1890:115-116) described *tudiculatum* as a variety of *maximus* Conrad (1839); Mansfield (1930:67) stated that there are only two specimens of this species known to exist. The authors questionably retain this species in the genus *Busycon*, specimens not seen.

*willcoxi* [*Busycon*] Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 240, pl. 34, figs. 1, 3.

TYPE LOCALITY: Pliocene—Waccamaw formation ?: Cape Fear River, North Carolina (Gardner, 1948:240).

OCCURRENCE: Pliocene — Waccamaw formation: Walker's Bluff, Cape Fear River, Bladen County, North Carolina; Neills Eddy Landing, Cape Fear River, Columbus County, North Carolina (Gardner, 1948:240).

REMARKS: Gardner (1948:240) stated that "the only form which *B. willcoxi* is comparable is the Miocene *B. carinatum* Conrad, possibly an ancestral type."

sp. [*Busycon*] Gardner, 1945, Mem. Geol. Soc. Am., no. 11, p. 206.

TYPE LOCALITY: Miocene—Guajalote formation: near San Fernando, Tamaulipas, Mexico (Gardner, 1945:206).

REMARKS: Known only from poorly preserved molds. Referred by

Gardner (1945:206) to the subgenus *Sycotypus*, an interesting record from the Miocene of northeastern Mexico.

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