

ABSTRACT

RELICT PLIOCENE MOLLUSCAN FAUNAS
IN THE CARIBBEAN

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The recent Caribbean molluscan province is shown to consist of a faunal mosaic in both time and space. Two areas, one off Yucatan, Mexico and one off northern Honduras, contain relict elements of the Neogene Caloosahatchian Province. The other area, off northern Colombia and Venezuela, contains an intact Pliocene fauna from the Neogene Gatunian Province. An ecological hypothesis for the persistence of these relict pockets into the recent is conjectured.

ABSTRACT

WHAT IS DIASTOMA? SYSTEMATIC POSITION OF THE
DIASTOMATIDAE

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Diastoma melanioides is the living survivor of a long lineage of snails which occurred in the Tethys Sea during the Tertiary. This species lives in southwestern Australia and its anatomy places it in the superfamily Cerithiacea. Anatomy, shell characters and the fossil record indicate familial status for *Diastoma*. Smaller Cerithiacean genera such as *Finella*, *Alaba*, and *Bittium* are excluded from this taxon.

ABSTRACT

PROTOCONCHS PAST AND PRESENT: A COMPARISON OF
SOME FOSSIL TURRIDAE WITH THEIR WESTERN
ATLANTIC AND EASTERN PACIFIC DESCENDENTS

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Environmental differences between the warm water Western Atlantic and Eastern Pacific provinces could have caused adaptive reproductive responses in the two faunas since the closing of the central American land bridge more than 2 or 3 million years ago. However, changes toward prolonged planktotrophy or lecithotrophy, as determined by protoconch characters, are not apparent when recent species in the Turridae genera *Polystira*, *Cerodrillia*, *Hindsiclava*, *Mitrolumna* and *Glyphostoma* are compared with fossil Miocene and Pliocene species from the old Caribbean.

Both recent faunas contain numbers of species with planktotrophic and lecithotrophic larvae. Two of the genera, *Polystira* and *Glyphostoma* have only species with planktotrophic larvae in the Eastern Pacific. This may be a reflection of the reproductive condition of their Miocene ancestors, not adaptation to present conditions.

ABSTRACT

SHELL DAMAGE AND REPAIR: A RARE SILURIAN EXAMPLE

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Cases of shell repair after attempted predation are common among Recent gastropods, but rare in the lower Paleozoic. A specimen of *Euomphalopterus*, an astraefiform archaeogastropod, which survived several major episodes of shell damage is described from the Silurian of Sweden.

ABSTRACT

LAND SNAILS AND ENVIRONMENTAL CHANGE AT
BARBERS POINT, OAHU, HAWAII

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Study of subfossil land snails from archaeological and paleontological sites at Barbers Point in the karstic Ewa Plains of Oahu, Hawaii, shows that prior to human occupation this relatively arid region was inhabited by a fauna of ca. 15 native terrestrial mollusk species. Taxa present were Helicinidae (1 sp.), Achatinellidae (= Tornatellinidae; ca. 4 spp.), Pupillidae s. l. (4 spp.), Amastridae (3 spp.), Endodontidae (2 spp.), and Succineidae (ca. 1 sp.). This fauna is indicative of a region of open-canopy dry-forest and grassland, a conclusion consistent with the paleoenvironment inferred by other workers on the basis of botanical evidence. The apparent advent of human influence is marked by the appearance of *Lamellaxis gracilis* (Subulinidae), a species known to have been introduced to Oceania prehistorically but not yet recorded from dated prehistoric context in Hawaii. A marked increase in the relative abundance of exotic taxa, including species known to have been introduced during the historic period, occurs coincidentally with the extinction of most native land snail taxa. The historically-introduced *Gastropopta servilis* (Pupillidae) is now the most abundant land mollusk in the area, although native species of *Lamellidea* and *Tornatellides* (Achatinellidae), *Lyropupa* (Pupillidae), and *Succinea* (Succineidae) are also present. The observed replacement of native land snail species by exotic taxa is undoubtedly the result of man-caused environmental modification, although the absolute chronology of these ecological changes has not yet been determined. It is hoped that further work will demonstrate the relative importance of the prehistoric and modern human inhabitants of Oahu in this process of faunal succession.

ABSTRACT

NAIADS FROM THE MOBILE RIVER SYSTEM,
PAST AND PRESENT

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Freshwater mussel remains recovered from three protohistoric indian sites in Alabama and Mississippi were analyzed and compared with recent collections. The results indicate that in

recent times both overall abundance and species diversity have decreased. Naiads were not found in streams near the two sites in Alabama on collecting trips made in 1978 - 1980. The most extensive analysis concerned the Mississippi site, on the upper Tombigbee River. The number of species collected from this river has declined from more than twenty-five in 1935 to only sixteen during field work in 1978 and 1980. In addition to changes in the overall naiad fauna, the relative contributions of many species have also changed, with eight showing an increase and nine a decrease. One species, *Plectomerus dombeyanus* (Valenciennes), appears to have become established in the upper Tombigbee River within the last three hundred years. Changes in the naiad population structure are related to changes in water quality due to increased pollution, siltation, and, most importantly, man made alterations of river channels, i.e. channelization and dam construction.

ABSTRACT

MAXIMAL LAND SNAIL DIVERSITY - NEW ZEALAND

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The central North Island of New Zealand is shown to have a climax community of 70-75 microsympatric land snail species, whereas most areas of the world have only 5-10 species occurring microsympatrically.

ABSTRACT

MORPHOMETRIC ANALYSIS OF SHELL CONVERGENCES AMONG MESODON, TRIODOPSIS, AND ALLOGONA (PULMONATA: POLYGYRIDAE).

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Pilsbry's (1940) monograph of Polygyridae called attention to four digeneric pairs of subgenera exhibiting convergence in shell shape. An objective assessment, using the logspiral growth model and multivariate analyses, revealed how remarkably close the convergences actually are. It remains to be determined whether these convergences represent adaptations to similar environments or random parallelisms resulting from shared genes.

ABSTRACT

TAXONOMY AND EVOLUTION OF THE GENUS MONADENIA (GASTROPODA: PULMONATA)

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Three subgenera of *Monadenia* Pilsbry, 1895, are recognized: *Monadenia sensu stricto*, inhabiting a humid coastal strip from southeast Alaska to central California; *Corynadenia* Berry, 1940, patchily distributed along the west slope of the central Sierra Nevada; and a new subgenus mostly confined to the Klamath Mountains of California, where it is parapatric with

Monadenia s.s.

Cladistic analysis groups *Corynadenia* with the new subgenus, with *Monadenia s.s.* less similar to either. The distribution of apomorphies falsifies all possible phylogenetic trees for the group except that which is isomorphous with the cladogram. Consequently, the proposed phylogenetic history of *Monadenia* consists of (1) a dichotomy between *Monadenia s.s.* and the common ancestor of *Corynadenia* and the new subgenus, followed in time by (2) a dichotomy between the latter two subgenera.

Three fossil forms referred to *Monadenia* are present in the John Day Formation (late Oligocene to early Miocene) of central Oregon. Shell types resembling modern *Monadenia s.s.* and the *Corynadenia*-new subgenus group are present. The Bridge Creek Flora (age 31.5 million years) from the lower member of the John Day Formation represents a mixed mesophytic forest dominated by broad-leaved deciduous trees, in a temperate climate with ample summer rainfall—similar to modern hardwood forests of eastern North America and eastern Asia. The source of the John Day land mollusks is the vertebrate-rich middle member, about 25 million years old; contemporaneous floras are also mixed mesophytic, possibly somewhat warmer than the Bridge Creek Flora. The Cascade Range was not a significant climatic or vegetational barrier at this time. The inferred environment may have supported greater intrageneric snail diversity than now seen in any forests of the west, much as the hardwood forests of the eastern United States now support diverse Polygyridae. Part of the early diversification of *Monadenia* probably involved habitat partitioning between ground-dwelling and arboreal species.

With subsequent shift from summer-wet to summer-dry climate, and depauperization of the woody flora by the Pliocene, substantial allopatry between the two stocks of *Monadenia* may have arisen, with the *Corynadenia*-new subgenus group inhabiting the drier interior regions and *Monadenia s.s.* exploiting a tendency toward eurytopy in humid environments. Thermal parameters now limit the ranges of the subgenera. A modern isothermal configuration suggests a model for conditions that may have enforced geographic separation between *Corynadenia* and the Klamath Mountains subgenus, leading to their differentiation.

ABSTRACT

GAMETOGENESIS IN THE LAND SNAIL, TRIODOPSIS MULTILINEATA

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The ovotestis consists of numerous clusters of slender lobes. The lobes are surrounded by blood spaces. Numerous blood vessels course between the lobes on their way to digestive gland tissue peripheral to the ovotestis in the whorl. Each lobe is bounded by a delicate squamous epithelium. This limiting epithelium encloses gametogenic cells and accessory cells.

Those gametogenic cells which will become oocytes remain in contact with the limiting membrane and differentiate within a compartment formed by accessory cells. When the oocyte reaches its definitive size it ruptures from the compartment and is free to move toward the tributary duct of the little hermaphroditic duct. The nucleus of the oocyte remains in prophase of the first meiotic division throughout its period of differentiation;