9. *CERION NANUS* (MAYNARD) (MOLLUSCA: CERIONIDAE) ON LITTLE CAYMAN

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Cerion nanus (Maynard) was collected on Little Cayman by Charles Johnson Maynard in the winter of 1888 and described the following year (Maynard 1889). Finding shells in only a very small area (6 yards by 20 yards) he considered 'that this species has the most restricted range of any animal with which I am acquainted'. In 1930 Paul Bartsch visited Maynard's locality and 'gathered two 8 oz. bottles full' of shells (Bartsch 1931). This summarises the reported history of *C. nanus*, a more detailed account being provided by Clench (1964).

Species of *Cerion* are of zoogeographical interest because of their generally restricted distributions. *C. martinianum* (Küster) is known only from Grand Cayman and *C. pannosum* (Maynard) only from Cayman Brac and Little Cayman. These two species differ from *C. nanus* in being closely allied to Cuban species; '*C. nanus* does not appear to be closely related to the other species of *Cerion* on the Cayman Islands or to any *Cerion* from the south coast of Cuba' (Clench 1964). Little Cayman is the only island of the group to support more than one *Cerion* species.

Cerion nanus localities

C. nanus was located at three sites close to each other during the 1975 expedition (Plates 52 and 53). Two sites are adjacent to the North Shore track running from the western end of Blossom Village in a northerly and then north-westerly direction to Spot Bay, and the third site lies along a track running west towards West End Point from the north side of the air-strip.

C. nanus was first found on 25th July at the place, here designated site A (centre at NM 960744), from which the type material described by Maynard was collected. No living *C. nanus* was found although empty shells were spread over a roughly circular area, bisected by the track, of about 35,000 sq.m. This is a much larger area than the 120 sq.m. reported by Maynard. On 2nd August, living snails were found at site B (centre NM 958746) about 350 m. NNW of the

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centre of site A. Snails occurred up to about ten metres on either side of the track for a distance of about thirty metres. The third *C. nanus* site, at which again only empty shells were found, extended up to two metres from the track (centre NM 940743) for a distance of about 490 m. Specimens are deposited in the British Museum (Natural History) (accession number 2265) and in the Manchester Museum (accession number 1024). The specimens figured in Plate 54 are in the Manchester Museum (reg. no. EE6001).

Topographically the three sites are similar and of rather distinctive formation. The coral limestone is flat, relatively smooth, and composed of large slabs with accumulations of sandy soil in depressions and cracks. The plant cover is sparse and areas several square metres in extent are devoid of shrubs exceeding about one metre in height. In this open, sun-baked, dry terrain the most conspicuous plant is *Evolvulus arbuscula* Poir. (Convolvulaceae), the crab bush, undoubtedly the 'heath-like plant' referred to by Maynard on which he found *C. nanus*. Living *C. nanus* at site B were found only on *Evolvulus* and the largest accumulations of empty shells at site A were usually beneath *Evolvulus*.

Only one other area that bore a resemblance, at least superficially, to the three *C. nanus* sites was found on Little Cayman. This is a small plateau on the north slope of Sparrowhawk Hill (PM 002781), but no trace of the snail was found here.

E. arbuscula is apparently confined to Little Cayman in the Cayman Islands, but it grows also on Cuba, Hispaniola, Jamaica and the Bahamas. *C. nanus* is very strongly, perhaps exclusively, associated with this plant, although it probably feeds upon epiphytic algae rather than on *Evolvulus* itself. *C. pannosum* is also frequently found on *Evolvulus* but it is plentiful on other plants as well. *C. pannosum* is widespread on Little Cayman, unlike *C. nanus*, and was found at most places visited and in particular abundance on the coastal strip.

Numbers of *Cerion nanus* and *C. pannosum* at sites A and B

Empty shells of *C. nanus* and *C. pannosum* were collected at sites A and B from 0.25 sq.m. quadrats. Twelve quadrats were sampled at site A and eight at site B. At each site, half of the quadrats encompassed *Evolvulus* plants and the remaining quadrats were placed between plants. All empty shells lying within the quadrats were collected and any soil present was sifted for buried shells. Numbers of fully grown and partly grown shells were counted (table 9).

At site A, numbers of living adult and immature *C. pannosum* on 116 *Evolvulus* plants were counted. At site B, numbers of living snails of both *Cerion* species on all the *Evolvulus* present, totalling 157 plants, were counted. These numbers are shown in table 9.

The data in table 9 can be interpreted in a number of ways. If it is assumed that empty shells of the two species persist for about the same length of time and that neither species is preferentially removed from the site, the comparatively low numbers of empty *C. nanus* shells at site A suggest that it has been extinct there for some time and/or it was always less numerous than *C. pannosum*. At site B, empty *C. nanus* shells occur at an insignificantly lower density than at site A, but they comprise a higher proportion of the total number of *Cerion* shells. At site B, fully grown shells of *C. nanus* and *C. pannosum* are present in equal numbers, but at site A fully developed *C. pannosum* shells clearly outnumber those of *C. nanus*. This might indicate a relatively recent colonisation of site B by *C. pannosum*.

Numbers of living snails at the two sites follow the pattern of the densities of empty shells, except for the absence of living *C. nanus* from site A. At site A, numbers of *C. pannosum* per *Evolvulus* plant are very much higher than at site B (8.8 compared with 2.0), consistent with the view that site B is a newly colonised, 'under-saturated' site for this species. Further, the proportion of juvenile to adult *C. pannosum* is much higher at site B (2.6 : 1) than at site A (0.9 : 1).

A feature of the data in table 9 is the relative scarcity of juvenile *C. nanus* in the samples. We are unable to favour any of the several possible explanations of this and the situation requires further investigation.

The numbers of *Evolvulus* plants with and without snails of either species at both sites are given in table 10. Significantly more plants at site A were occupied by snails ($X^2 = 21.1$, $P<0.001$), adding weight to the supposition that site A is more snail 'saturated' than site B.

Considering the distribution of living snails of the two species on a presence or absence basis over all the plants at site B (table 11), more *Evolvulus* are without snails than would be expected on a random distribution of each snail species. There is, therefore, a tendency for the two species to favour the same *Evolvulus* plants ($X^2 = 9.4$, $P<0.01$, Cole's Coefficient of Association = 0.53).

Discussion

The occurrence of two species of *Cerion* on Little Cayman, a small island, is unusual. The larger *C. pannosum* is clearly the dominant species, being widespread on the island and occupying a variety of habitats. *C. nanus* is exceedingly localised and appears to be dependant upon *Evolvulus*, although it is by no means found wherever this plant grows. The co-existence of the two *Cerion* species at site B, and their tendency to occur on the same *Evolvulus* plants here, might suggest that interspecific competition is somehow reduced or avoided. On the other hand, in the above account of the situation in 1975, we imply that the two species are unable to co-exist for a prolonged period, *C. pannosum* ultimately replacing *C. nanus*. Such a replacement has certainly occurred at site A, *C. nanus* having

Table 8. Numbers of living adult and juvenile *Cerion nanus* and *C. pannosum* found on *Evolvulus* plants, and the numbers of empty shells of the two species per 0.25 sq.m., at sites A and B.

	Cerion nanus		*Cerion pannosum*	
	adults	juveniles	adults	juveniles
Living snails				
Site A (116 plants)	0	0	547	468
Site B (157 plants)	78	10	88	226
Mean numbers of empty shells per 0.25 sq.m. (±s.e.)				
Site A	17.3±6.2	0.4±0.2	31.2±3.5	29.2±8.1
Site B	11.6±4.1	0.5±0.3	11.6±3.5	22.8±10.9

Table 9. Numbers of *Evolvulus* plants with and without *Cerion* of either species at sites A and B.

	with *Cerion*	without *Cerion*	number of plants
Site A	108	8	116
Site B	111	46	157

Table 10. Numbers of *Evolvulus* plants carrying live *Cerion* of one or both species at site B. The expected figures assume a random distribution of each species.

Numbers of plants with:	observed	expected
no snails	46	37
C. pannosum only	61	70
C. nanus only	9	18
both species	41	32

disappeared as a living animal during the period since Maynard made his original collection. Whether or not *C. pannosum* occurred at site A when Maynard and Bartsch collected there is unfortunately not known. If, as we incline to believe, continued co-existence of the two species is impossible, *C. pannosum* might be expected eventually to completely displace *C. nanus* from Little Cayman. However, it is difficult to reconcile this simplistic view with the continued presence of *C. nanus*. Why has displacement not already occurred? *C. pannosum* has been on Little Cayman for a long time, as shown by the sub-fossil shells found at various places on the island. It is no recent coloniser. Further, there is no evidence that *C. nanus* was at one time more widespread on the island than it is today.

Further speculation is unlikely to be profitable until more information is available, but the situation is interesting and it is to be hoped that any development on Little Cayman avoids disturbance to the small area where *C. nanus* continues precariously to survive.

References

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Plate 52. The site on the trans-island track north of Blossom Village where living *Cerion nanus* was found. The snails were living on shrubs of *Evolvulus arbuscula* here seen growing on the path

Plate 53. *Cerion nanus* and young *C. pannosum* on a single plant of *Evolvulus arbuscula*. Inset: a living specimen of *C. nanus*

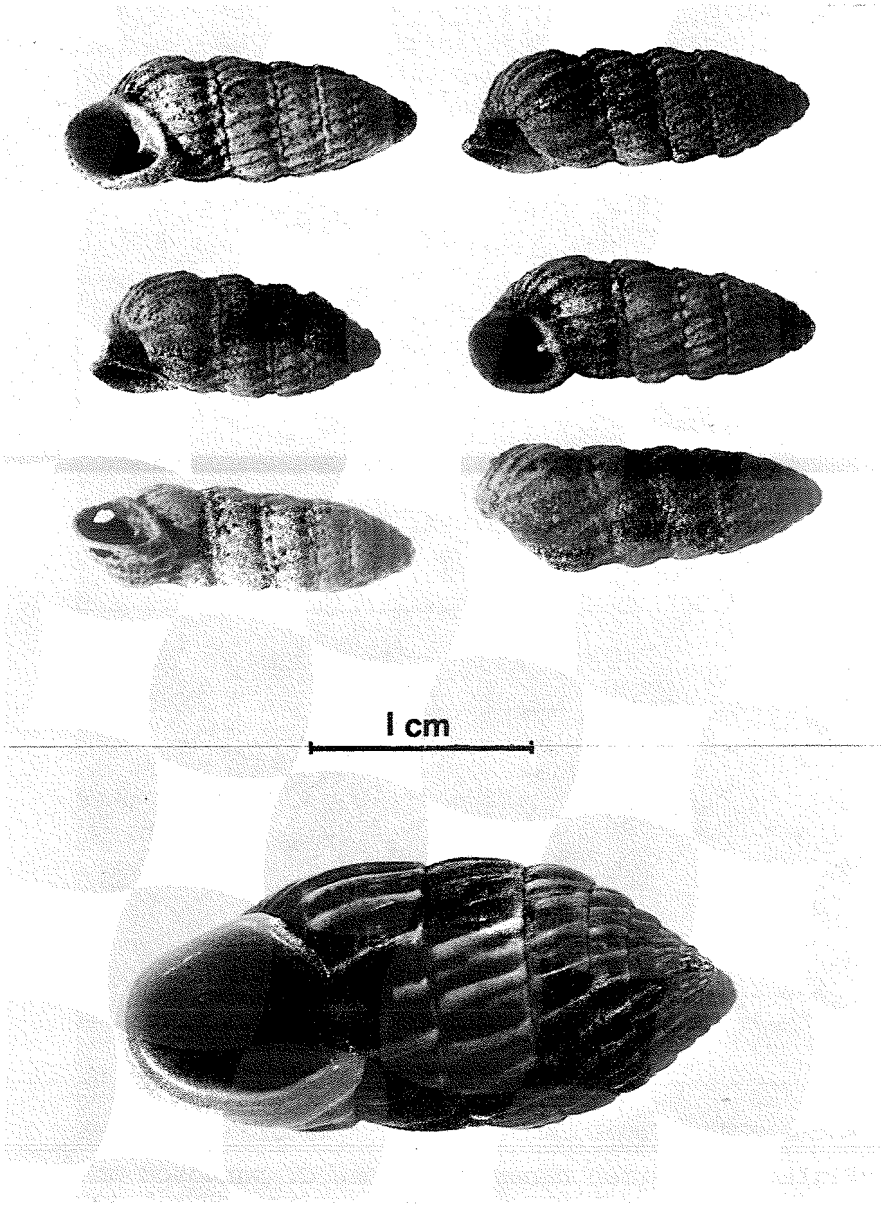

Plate 54. Six shells of *C. nanus* with an example of *C. pannosum* for comparison (to the same scale). Four typical shells are shown together with two examples of extremes in length/height ratio