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# A review of the genus *Isaurus* Gray, 1828 (Zoanthidea), including new records from Fiji

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The brachycnemic zoanthid genus *Isaurus* is characterized and its synonymy reviewed. Two species were found on exposed intertidal reefs in Fiji. One is identified as *I. tuberculatus* Gray, here revealed as almost cosmopolitan within and just outside the tropics and considered to include the nominal Caribbean species *I. duchassaingi* (Andres), the East African *I. spongiosus* (Andres), the Australian *I. asymmetricus* Haddon and Shackleton, and the Hawaiian *I. elongatus* Verrill. Though generally characteristic of reef-top environments, some details are given of a sublittoral habitat and specimens from northeast Australia. The second reef species is described as *I. maculatus* sp. nov. *I. cliftoni* (Gray) is the third species recognized although the holotype cannot be traced. Subsequent records of this species are clarified. The three species are described and two illustrated.



## Introduction

The order Zoanthidea (Anthozoa, Zoantharia) is an abundant group on tropical shores, reefs and shallow seas. Some 60 species in five genera have been described from the tropical West Pacific Ocean (Walsh and Bowers 1971). Recent descriptions of Indo-Pacific zoanthids are by Walsh and Bowers (1971) for Hawaii, and Herberts (1972) for Madagascar. Despite the commonness of zoanthids, their taxonomy remains chaotic and little is known of their biology. (Larson and Larson (1982), however, have recently studied the biology of *Isaurus* at Belize.) A number of factors contribute to this unfortunate state of affairs, among them: variable polyp and colony form, lack of skeletal structures, failure by taxonomists to evaluate the criteria used, and the reliance on preserved material as the basis of most published accounts. Many of the earlier papers are extremely unsatisfactory, and the species described therein scarcely recognizable.

During 1979 and 1980 a collection of Zoanthidea was obtained from fringing reefs in the southwest of Viti Levu, the main island in the Fiji group, and from offshore reefs in the southeast. The collection was supplemented by further sampling in Fiji and Australia in 1982.

The coral reefs of the Fiji archipelago (fig. 1) are biologically almost undescribed. Early accounts (Agassiz 1899, Davis 1920) were concerned primarily with geomorphology and the extent to which the reefs appeared to support or contradict Darwin's theory of atoll formation. A brief general account has been given by Ryland (1982 a). The biota of the exposed fringing reefs of the southwest, the 'Coral Coast' (fig. 1 D), have

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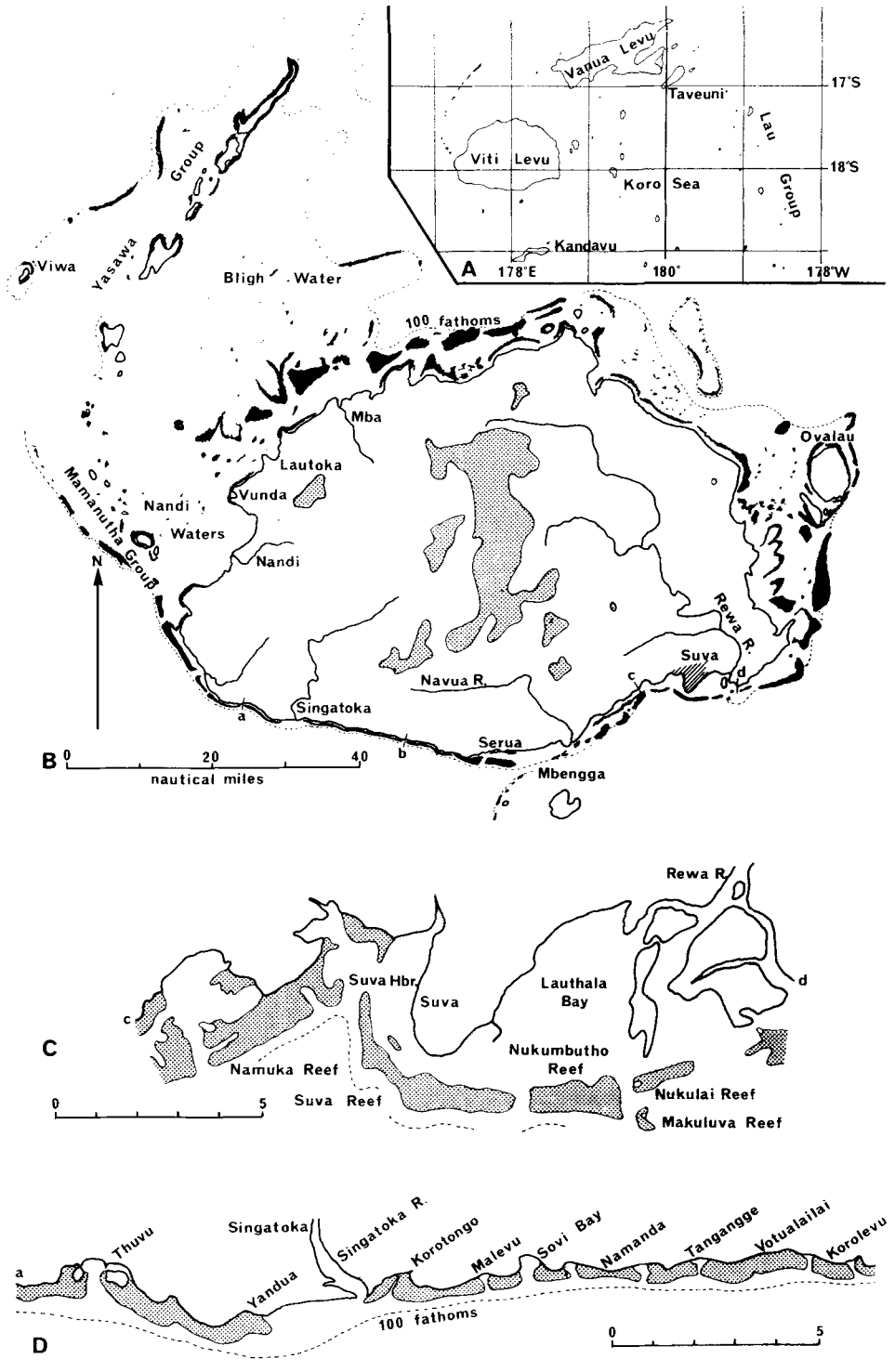


FIG. 1. Reef localities in Fiji: A, The Fiji archipelago; B, The island of Viti Levu, land over 600 m stippled, reefs black; C, Reefs off Suva Point (reefs stippled, scale as D); D, The 'Coral Coast' from Thuvu to Korolevu (reefs stippled, scale in nautical miles).

been briefly described by Ryland (1982 b) and in a University of the South Pacific teaching manual (Morton and Raj 1982). The latter also provide the only available account of the southeast reefs (fig. 1 C). Suva Barrier is a linear reef with its front approximately 2·5 km offshore from the Suva peninsula. Nukumbutho is separated from it by a narrow passage, while Makuluva, a small reef and cay, lies slightly outside the line of linear reefs, directly opposite the present position of the main distributory of the Rewa River. The general arrangement of reefs is shown in fig. 1 C, while details may be obtained from British Admiralty chart 1674 (Eastern Approaches to Suva Harbour). The southeast reefs are up to 1·5 km in width, with a flat that dries at low water of spring tides but is backed by a shallow navigable channel between the reef and the shore.

The Coral Coast reefs face SSW and the Suva reefs almost south. The fronts of both are thus aligned obliquely to the prevailing southeast tradewinds but the Coral Coast reefs appear both more exposed and more oceanic. These are fringing reefs some 500–600 m in width, divided into sections 1–3 km long by 100–300 m wide passes associated with the outflow of creeks arising in the Southern Coastal Range of hills (fig. 1 D). The spur and groove reef front rises to a coralline algal ridge, bearing a permanent belt of *Sargassum cristaefolium* C. Agardh, backed by a reef flat over which water lies impounded (Ryland 1982 b). Different conditions and communities characterize the passes.

The reefs in both of these areas bear a notable abundance of zoanthids belonging to four genera: *Zoanthus*, *Palythoa* (with the zooids immersed in a colonial coenenchyme), *Protopalythoa* (with the zooids discrete, becoming nearly or wholly separated after formation) and *Isaurus*. This paper deals with *Isaurus* while a second will treat the remaining genera. Two species of *Isaurus* (*I. tuberculatus* and *I. maculatus* sp. nov) have been found in Fiji but only in the wavebreak zone of the reef front or the outer sections of the passes, never on reef flats or on sheltered fringing or patch reefs or on the lee side of Viti Levu. Other records of one of these species and published descriptions of all nominal species referred to this genus are considered.

## Family **ZOANTHIDAE** Gray, 1840

Zoanthidea with mesenteries brachycnemic (i.e., with fifth couple imperfect) and a mesogloeal sphincter muscle.

### ***Isaurus*** Gray

*Isaurus* Gray, 1828, p. 8.
*Zoanthus* Duchassaing, 1850, p. 11 (*pars*).
*Antinedia* Duchassaing and Michelotti, 1866, p. 42, pl. VI, figs. 2, 3.
*Pales* Gray, 1867, p. 236, fig. 1.
*Panceria* Andres, 1877, p. 221–226, pl. XVI.
*Polythoa* (*Monothoa*) Andres, 1884, p. 315 (*pars*).
*Zoanthus* (*Monanthus*) Andres, 1884, p. 326 (*pars*).
*Mammillifera* McMurrich, 1889, p. 117.

*Diagnosis*: Polyps solitary or in loosely connected clusters, with or without stolons; column unencrusted; with a single well developed mesogloeal sphincter muscle and a discontinuous ectoderm. Mesogloea with or without endodermal invaginations ('bays'). Height 15–160 mm, very variable. Zooxanthellae present in both ectoderm and endoderm. Polyps asymmetric externally, with a concave and convex side; more or less recumbent by day, becoming upright and opening only at night. Polyps gonochoristic or hermaphrodite.

*Type species*: *Isaurus tuberculatus* Gray, 1828, by monotypy.

Three species have been recognized in the material from Fiji and other localities, *I. tuberculatus* Gray, *I. maculatus* sp. nov. and *I. cliftoni* (Gray), separable by the following key:

1 All zooids externally smooth; capitulum and scapus always continuous. Mauve/purple blotches present along the full length of the polyp. . . . . *I. cliftoni*
Zooids with tubercles along the convex side . . . . . 2
2 Tubercles large, often arranged in longitudinal series. Capitulum usually separated from the scapus by crown tubercles (Larson and Larson, 1982). Occasional non-tuberculate polyps may exist among others of typical form . *I. tuberculatus* (fig. 2)
Tubercles small and numerous, arranged in longitudinal series and transverse rows which create an appearance of orthogonal reticulation. Capitulum not separated from the scapus by crown tubercles . . . . . *I. maculatus* (fig. 3)



## ***Isaurus tuberculatus*** Gray

Fig. 2

*Isaurus tuberculatus* Gray, 1828, p. 8.
*Zoanthus tuberculatus* Duchassaing, 1850, p. 11.
*Zoanthus tuberculatus* Duchassaing and Michelotti, 1860, p. 327, pl. VIII, fig. 5.
*Antinedia tuberculata* Duchassaing and Michelotti, 1866, p. 136, pl. VI, fig. 2, 3.
*Panceria spongiosa* Andres, 1877, p. 221, pl. XVI.
*Antinedia Duchassaingi* Andres, 1884, p. 330.
*Polythoa* (*Monothoa*) *spongiosa* Andres, 1884, p. 315.
*Zoanthus* (*Monanthus*) *tuberculatus* Gray: Andres, 1884, p. 326.
*Mammillifera tuberculata* (Gray): McMurrich, 1889, p. 117.
*Isaurus asymmetricus* Haddon and Shackleton, 1891, p. 684.
*Isaurus Duchassaingi* (Andres): McMurrich, 1896, p. 190, pl. XVII, fig. 6.
*Isaurus Duchassaingi* (Andres): Duerden, 1898, p. 346.
*Isaurus duchassaingi* (Andres): Duerden, 1902, p. 336.
*Isaurus duchassaingi* (Andres): Southwell, 1906.
*Isaurus elongatus* Verrill, 1928, p. 30, pl. V, E, F, fig. 3 q.
*Isaurus spongiosus* (Andres): Carlgren, 1939, p. 117, pl. III, fig. 1.
*Isaurus asymmetricus* A. C. Haddon and A. M. Shackleton, 1891: Pax and Müller, 1957, p. 34.
*Isaurus elongatus* Verrill: Walsh and Bowers, 1971, p. 162.
*Isaurus spongiosus* Andres, 1877: Herberts, 1972, p. 106.
*Isaurus duchassaingi* (Andres): Larson and Larson, 1982.

*Type specimen*: J. E. Gray's (1828) specimen, British Museum (Natural History) reg. no. 1978.8.8.1.

*New records*: Nukumbutho reef crest, Lauthala Bay, Fiji; Malevu fringing reef, Fiji; Radar reef, Rottnest Island, Western Australia; 25 m, off Townsville, Queensland, Australia.

*Diagnosis*: *Isaurus* with varying number of characteristic large tubercles over the body surface. Polyps lacking tubercles occur uncommonly amongst those, presumably clone mates, having the usual distribution of tubercles. Crown tubercles (Larson and Larson 1982) forming a characteristic and definite edge to the capitulum; body tubercles usually arranged in longitudinal series.

*Description and comments*: *I. tuberculatus* is characterized by the tubercles which are unevenly distributed (although often forming longitudinal series) on what, in the normal posture, is the upward facing portion of the column. The capitulum is well formed, owing to the presence of the 'crown tubercles', to which attention was drawn by Larson and Larson (1982). The polyps are almost invariably externally asymmetric, bending parallel to the substratum. As observed by Larson and Larson (1982), the

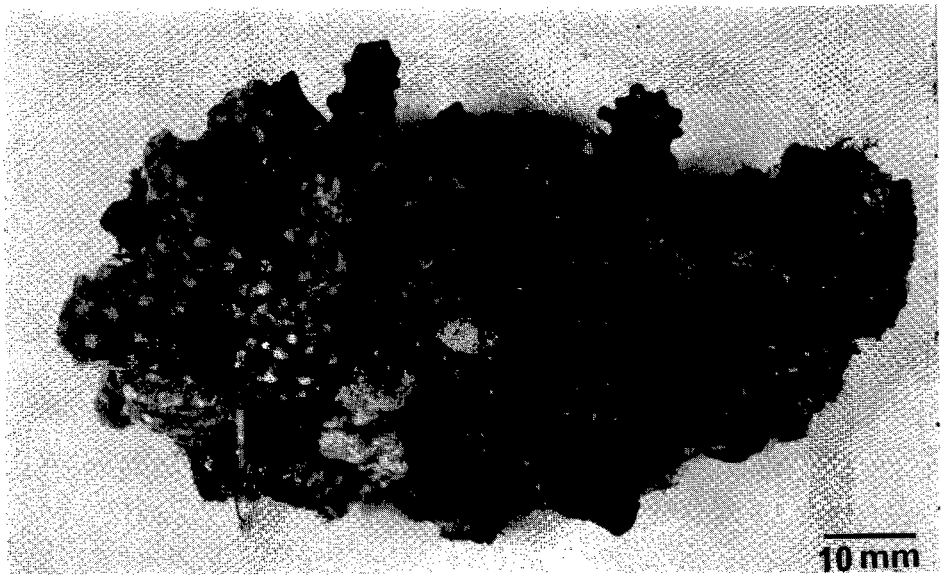


FIG. 2. *Isaurus tuberculatus* Gray. Colony from wavebreak zone Malevu fringing reef, Viti Levu, 11 August, 1979.



polyps become upright and the tentacles are spread for feeding only during the night. Neighbouring polyps in a clump are not aligned with each other. The reef top material from Fiji contains squat (10–15 mm) to relatively elongate (35–40 mm) zooids. In life the body wall coloration is variable, commonly green or greyish except for the tubercles which are cream/white. Soon after fixation and preservation in 70% ethanol or 10% seawater formalin the entire polyp appears cream/brown. Tentacles white (Larson and Larson 1982, P. Arnold, personal communication).

As implied by Larson and Larson (1982), it seems likely that the different morphologies of zooids found by ourselves and other workers reflect the differing habitats in which the specimens have been found, particularly the degree of exposure there. Walsh and Bowers (1971) found the tall form they referred to *I. elongatus* in crevices. The tall and short forms of *I. asymmetricus* (Haddon and Shackleton 1891) came respectively from 'shallow' and 'deep' locations. Similar tall polyps of *I. tuberculatus* occur sublittorally in Queensland. This type of morphological variation has also been recognized in *Zoanthus sociatus* (Karlson 1982).

Specimens of *I. tuberculatus* have been collected during sublittoral surveys off Townsville. P. Arnold (personal communication) describes these specimens as generally elongate (up to 70 mm in life), with the body wall smooth or asymmetrically tuberculate. Living specimens are yellowish-brown; the body wall is translucent to whitish, usually with patches of irridescent yellowish-green. The tubercles are white. Specimens preserved in formalin usually appear yellowish-brown.

The tubercles are thickenings of the mesogloea, not always corresponding to the endodermal and ectodermal bays (invaginations) which have been well documented previously (McMurrich 1889, 1896, Duerden 1898, 1902).

Hermaphrodite (McMurrich 1889, Larson and Larson 1982) and apparently gonochoristic zooids (Herberts 1972, Larson and Larson 1982) of *I. tuberculatus* have been recorded in the past. Only one fertile zooid has been found in the Fijian

collections, a fully mature hermaphrodite collected on its own from Suva Barrier Reef on 12 December 1978. The other collections, without exception made during the cooler months April to August, comprised only infertile zooids. It thus appears likely that the season for sexual reproduction is short and falls during the hot season (December to February) as in the Caribbean *Zoanthus solanderi* (Karlson 1982). However, in examining small numbers of specimens obtained in various months off Townsville (January, February, March, April, August and October), P. Arnold saw no eggs or testes. Asexual replication, which takes place by stoloniferous growth followed by degeneration of the stolon, is occurring in many of the Fijian samples, irrespective of the month of collection.

Along transects off Townsville, sampling at depths of 5–40 m, *I. tuberculatus* has been regularly collected in 25–40 m (P. Arnold). Polyps were obtained singly or in clusters, invariably attached to small pieces of hard substratum such as nodules of coralline algae, fragments of bivalve shell, conglomerates of serpulid tubes, tests of the foraminiferan *Marginopora vertebralis* Blainville, or segments of *Halimeda*. Biological associates here included an unidentified ascothoracican (*cf. Baccalaureus*) and the architectonicid gastropod *Heliacus variegatus* (Gmelin).

*Discussion*: Gray (1828) erected the genus *Isaurus* when describing *I. tuberculatus*, a British Museum specimen of unknown origin. In preparing his description he utilized some of Savigny's (1811) figures in order to show an expanded polyp. Savigny, using the non-Latin name Isaure, figured four species (by implication congeneric) but published neither generic nor specific descriptions. Whether or not Gray was correct in attributing Savigny's figures to his species is uncertain as the illustrations do not show any characters diagnostic of this genus.

Duchassaing (1850), apparently unaware of Gray's account, described a new species, *Zoanthus tuberculatus*, from Guadeloupe. This was mentioned again by Duchassaing and Michelotti (1860) but later (1866) referred by them to another genus, *Antinedia*.

Andres (1884) was the first to compare the descriptions of Gray (1828) and Duchassaing and Michelotti (1866). Believing them to be based on separate species he introduced *Antinedia duchassaingi* for the Guadeloupe specimens and referred Gray's *I. tuberculatus* to *Zoanthus* (*Monanthus*) *tuberculatus*, a new subgenus. McMurrich (1889) reported on specimens from Bermuda, stating that there was 'little room for doubt' that the two nominal species previously described were not distinct and should be called *Mammillifera tuberculata*, using a genus erected by Leseuer (1817) which he considered to be the senior synonym of *Antinedia*. McMurrich's account contained the first records of reproductive structures in this genus, many of his polyps being hermaphrodite. Haddon and Shackleton (1891) reviewed the genus *Isaurus*, reinstating the generic name, claiming that McMurrich's Bermudan specimens did not conform with Leseuer's inadequate definition of the genus *Mammillifera*. They also described a new species, *I. asymmetricus*, from the Torres Straits differentiated by the 'lesser number and greater size of the tubercles' and the fact that polyps of the intertidal Torres Straits specimens were twice the length of the West Indian forms. This ignored the circumstance that the polyps of the sublittoral Torres Straits specimen were the same size as the West Indian specimens (Duchassaing 1850, McMurrich 1889). Since Haddon and Shackleton's syntypes of *I. asymmetricus* were from different localities, we designate as lectotype the shorter specimen from '15–20 fathoms, between reefs, Murray Islands,' reg. no. 1891.10.1.13 in the British Museum (Natural History). Both are now stored under the name of *I. tuberculatus*, though they have not, until now, been

formally synonymized with that species. Haddon and Shackleton recognized that two other nominal species, *Pales cliftoni* Gray (1867) and *Panceria spongiosa* Andres (1877), should be referred to *Isaurus*. McMurrich (1896) acknowledged Haddon and Shackleton's conclusions and agreed that his Bermudan form should be called *I. tuberculatus*. He also stated that his earlier synonymizing of *Antinedia tuberculata* Duchassaing and Michelotti (1866) with *I. tuberculatus* Gray (1828) was incorrect and that the Guadeloupe species, which he also recorded from the Bahama Islands, should be known as *I. duchassaingi*.

Pax and Müller (1957) recorded *I. asymmetricus* from Vietnam, giving only a brief account which does not allow differentiation of their species from *I. tuberculatus*.

Verrill (1928) described *I. elongatus* from Hawaii, and his account has since been amplified by Walsh and Bowers (1971). Verrill's original drawings closely resemble both the taller *I. asymmetricus* in the British Museum and sublittoral specimens recently collected in Australia. The only specific difference claimed by Verrill was the greater height of the polyps, though they were in fact no bigger than those on record from Torres Straits. Walsh and Bowers' (1971) description of *I. elongatus* claims in addition a cnidom differance, namely the size of the ectodermal holotrichs. In preparations made from Hawaiian specimens conforming to *I. elongatus*, measurements do not agree with those given by Walsh and Bowers but are identical with ours of *I. tuberculatus* from Fiji. Also, our slides indicate that cnidom complement and measurements of all *Isaurus* species may be regarded as the same (table 1) and may therefore be used only as generic characters. This agrees with the conclusions of Herberts (1972), on other zoanthid genera, that cnidom measurements alone are insufficient for species identification.

In 1867 Gray described briefly a new species, *Pales cliftoni* based on a specimen which had been collected from an unspecified locality in Western Australia. Although he erected a new genus, he recognized the close relationshop of *P. cliftoni* to *I. tuberculatus*. The only adequate description and further record of *I. cliftoni* is that of Carlgren (1954). His specimens were taken from Rottnest Island, Western Australia.

Table 1 shows the various cnidom values which have been published for members of this genus together with values for the specimens we have examined. We use the terminology of Schmidt (1974) and Rifkin (1982) which is equated with that of Cuttress (1956) and Weill (1934): mastigophores in the table equate with rhabdoids and are heteronemes; holotrichs are the only form of haplonemes to occur in the Zoanthidea.

Herberts (1972) gave cnidom values for *Parazoanthus axinellae* which showed that the values for a single species may vary so much from one geographical location to another that they are of no taxonomic value for species differentiation, although their location within the zooids is still valid as a generic character.

Andres (1877) erected yet another new genus when describing *Panceria spongiosa* from Port Natal. In doing so he stated that it should remain distinct only 'so long as the already established genera retain that rank'. The genera to which he referred were: *Polythoa*, *Zoanthus*, *Mammillifera*, *Pales* and *Isaurus*. He gave a key for use in differentiating between these but, for those which have subsequently been synonymized with *Isaurus*, he used characters such as presence or absence of a velum and the degree of isolation of individuals (persistence of coenenchyme). The many *Isaurus* specimens which we have examined show enough variation in these characters to invalidate any use of *Pales*, *Panceria* and *Mammillifera* (*sensu* McMurrich 1889) as genera distinct from *Isaurus*.

Later, Andres (1884) transferred both *I. tuberculatus* and *Pales cliftoni* to *Zoanthus* (*Monanthus*), and *Panceria spongiosa* to *Polythoa* (*Monothoa*). Obviously he

Table 1. Summary of available cnidom measurements for the genus *Isaurus* (dimensions of the capsule in $\mu$m).

| | Ectoderm | Mesenteries (endoderm) | Mesenterial filaments | Actinopharynx | Tentacles |
|---|---|---|---|---|---|
| | holotrichs | holotrichs | b-rhabdoids | b-rhabdoids | spirocysts |
| *I. tuberculatus* (Fiji) | 19·1–30·0 × 6·5–10·0 | 8·5–12·0 × 3·0–5·0 | 2·5–5·0 × 10·5–17·0 | 2·5–5·0 × 15·0–20·0 | 12·0–22·0 × 2·0–3·0 |
| *I. tuberculatus* Coll. A. Birtles/ P. Arnold, Townsville, 1982 | 22·0–33·0 × 10·5–13·0 | 9·0–12·0 × 3·0–6·0 | 3·0–5·0 × 11·0–19·0 | 3·0–5·5 × 13·0–17·0 | 10·0–19·0 × 2·0–3·0 |
| *I. tuberculatus* Coll. L. M. Marsh W. Australia, 1982 | 22·0–26·0 × 6·0–8·0 | 10·5–13·5 × 4·5–5·5 | 3·0–5·0 × 14·0–18·5 | 2·5–4·0 × 14·5–22·0 | 13·5–16·0 × 2·5–4·5 |
| *I. spongiosus* Herberts, 1972 | 16·4–27·0 × 7·3–9·5 | 9·0–12·0 × 3·6–5·4 in canals 21–23 × 7·2 | microbasic mastigophores | microbasic mastigophores | 14·5–24·5 × 2–4 |
| *I. spongiosus* Carlgren, 1939 | 23–32 × 10–12 | 10–14 × 4·5–5 | 12·7–19·2 × 1·8–4·5 holotrichs 31 × 10 microbasic mastigophores 22–24 × 3–4 15·5–19 × 4–4·5 | 13–23 × 2–3·6 microbasic mastigophores 22–24 × 3–4 | 14–28 × 2–4 |

| | | | | | |
|---|---|---|---|---|---|
| *I. elongatus* Walsh and Bowers, 1971 | 30–36 × 10–12 | 10–28 × 4–10 | microbasic-p-mastigophores 15–17 × 3–5<br>spirocysts 19–26 × 3–4 | microbasic-p-mastigophores 18–23 × 4–5<br>spirocysts 16–24 × 2–4<br>holotrichs 10–15 × 4–6 | 16–26 × 2–4 |
| *I. elongatus* Coll. W. J. Cooke/ A. Muirhead, 1982 | 22–26 × 6–8 | 10–11·5 × 4·5–5·5 | rhabdoids 16–18 × 2·5–4·5 | rhabdoids 17–19·5 × 4·0–4·5 | 9–18 × 2·3 |
| *I. asymmetricus* Pax and Müller, 1957 | 23 × 10 | — | microbasic-b-mastigophores 36 | — | 19 |
| *I. maculatus* (Fiji) | 20·0–29·5 × 6·5–9·5 | 8·5–10·5 × 3·5–5·0 | b-rhabdoids 2·5–6·0 × 13·5–18·5 | b-rhabdoids 2·5–5·0 × 13·5–19·5 | 12·0–21·0 × 2·0–3·0 |
| *I. cliftoni* Carlgren, 1954 | 24·0–29·6 × 10–11·3 | — | holotrichs 13–17 × 5–7·5<br>22·6–29·6 × 10–11<br>microbasic-p-mastigophores 17–21 × 4·2–5·6 | holotrichs 11·3–14 × 5·5–6·3<br>22–28·2 × 7·5–10<br>microbasic-p-mastigophores 18 × 4·2 | — |
| *I. cliftoni* Coll. D. Devaney/ L. M. Marsh, 1977 | 24·0–29·0 × 6·5–8·5 | — | rhabdoids 15·0–18·5 × 3·0–5·0 | rhabdoids 13·0–17·5 × 3·0–5·0 | 9·0–17·0 × 2·0–3·0 |

Note: Where a single measurement is given, the authors did not specify which dimension was measured. The terminology and measurements are those given by the authors. Holotrichs are haplonemes; mastigophores in the table equate with rhabdoids and are heteronemes (see references in text).

recognized that *I. tuberculatus* and *P. cliftoni* were closely related but failed to identify *Panceria spongiosa* as congeneric with *Pales cliftoni*, despite the similarity of his figure (Andres 1877, p. 16, fig. 1) and Gray's (1867).

The only subsequent records of *I. spongiosus* are those of Carlgren (1939) from South Africa and Herberts (1972) from Tulear, Madagascar. In our view their descriptions prove *I. spongiosus* to be synonymous with *I. tuberculatus*.

We conclude that the degree of variability of polyp form of *I. tuberculatus* had not been adequately recognized in any publication prior to Larson and Larson (1982). Consequently, many authors, having examined only a small number of polyps, have given inadequate and differing accounts which have caused great taxonomic confusion. It can now be seen that both the variation within a single clump and that between neighbouring clonal groups should always be considered.

*Geographical distribution: I. tuberculatus* is pantropical, ranging from Hawaii (21°20′N) in the Pacific to the vicinity of Perth (32°S) in Western Australia. In the Atlantic it extends north to Bermuda (30°06′N). Both the coast of Western Australia (Wilson and Marsh 1979) and Bermuda benefit from warm currents which extend the range of normally tropical species.



### ***Isaurus maculatus*** sp. nov.

Fig. 3

*Type specimen*: British Museum (Natural History) reg. no. 1981.5.1.1. collected by J. S. Ryland from the type locality, 7 September, 1979.

*Type locality: Sargassum cristaefolium* zone of the reef crest. Korotongo fringing reef, near Singatoka in southwest Viti Levu, Fiji, 18°11′S, 177°34′E.

*Colour in life*: Body wall pale grey but covered with many darkly pigmented small low tubercles which are regularly arranged in both rows and series.

*Diagnosis*: The capitulum continuous with the scapus; large tubercles never present. Individuals all of the same form with little morphological variation within a clump or between neighbouring clumps. Length 30–70 mm.

*Description and comments*: This species is immediately recognizable in the field. It never has large crown and body tubercles. Although in Fiji it occurs on the same reefs as *I. tuberculatus*, its habitat is more restricted and the two species are quite distinct. *I. maculatus* has been found only in the wavebreak zone and reef crest of the southwestern fringing reefs of Viti Levu.

In other characteristics *I. maculatus* resembles other members of the genus. No fertile polyps have been found but individuals have been observed to be propagating asexually in the manner described for *I. tuberculatus*. Polyps have never been recorded feeding despite the use of overnight time lapse photography in aquaria in Fiji.

### ***Isaurus cliftoni*** (Gray)

*Pales cliftoni* Gray, 1867, p. 235, fig. 1.
*Zoanthus (Monanthus) cliftonii*: Andres, 1884, p. 329.
*Isaurus cliftoni* (Gray): Carlgren, 1954, p. 584.

*Type specimen*: We have been unable to locate the material described by Gray (1867) in the British Museum (Natural History). Gray's drawing (1867, fig. 1) must therefore be considered to represent the missing type.

*Type locality*: Western Australia.

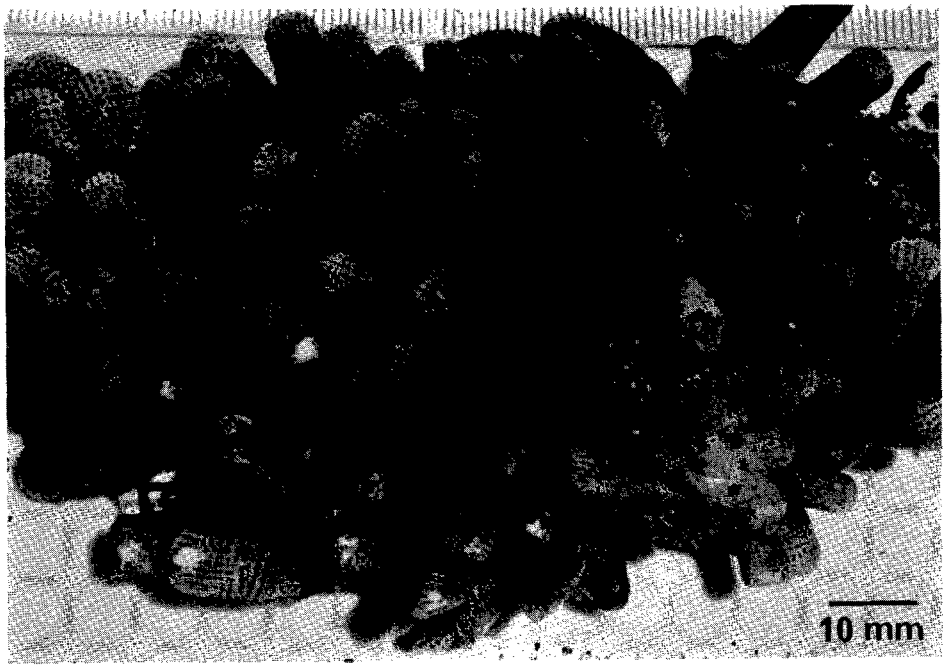


FIG. 3. *Isaurus maculatus* sp. nov. Holotype, from wavebreak zone, Korotongo fringing reef, Viti Levu, 7 September, 1979.



*Colour in life*: Emerald green with mauve blotches (see below).

*Diagnosis*: Internal structure as in other *Isaurus* species. Occurs in clusters of zooids, each up to 65 mm in length. Column surface without tubercles, smooth and shiny in life. Preserved material cream/brown in colour.

*Description and comments*: Gray's initial description of this species is very brief and of no help to the taxonomist. Because the type specimen cannot be traced, Carlgren's (1954) description is all that can be used to compare this species with other members of the genus. Carlgren's material was collected in 1951 by Mrs L. M. Marsh of the Western Australian Museum. Mrs Marsh also made available specimens collected in 1977 and 1982 and thought to be the same species. The 1951 material had been divided by Carlgren (1954) into two species, *Isaurus cliftoni* (Gray) and *Zoanthus praelongus* sp. nov., even though they had initially been collected as one species. In his descriptions, however, he wrongly attributes the 'emerald green with mauve blotches' coloration to *Z. praelongus* (*fide* L. M. Marsh). The later material that Mrs Marsh sent to us also contains both *I. cliftoni* (1977, coll. D. Devaney/L.M. Marsh) and *Zoanthus praelongus* (1982, coll. L. M. Marsh). Once preserved it is impossible to distinguish between the two species other than by histological examination. In sections, the discontinuous ectoderm and single sphincter muscle of *I. cliftoni* allow positive identification. Mrs Marsh's original notes suggest that there may be a difference in colony morphology that can be utilised for identification in the field. The colonies of *Zoanthus praelongus* are often large, covering areas 0·5–1 m in diameter, whereas those of *I. cliftoni* are clumps of few zooids. These colony features are consistent with those of both genera as observed by us in Fiji.

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# A review of the genus *Isaurus* Gray, 1828 (Zoanthidea), including new records from Fiji

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