of the crystalline substance of the above two sources was established as lycorine. Many hybrid varieties of Amaryllidaceæ were reported to contain more than one alkaloid and it is unique that this *Co-operanthes* hybrid contains lycorine only while the reported *Zephyranthes* species and *Cooperia* contain more than one alkaloid.

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METHOD FOR RAPID IDENTIFICATION OF *NOCARDIA*

THE genus *Nocardia* was initially characterised on the basis of morphological characters[1] but nevertheless recent investigations of Gordon and Smith[2] and Gordon and Mihm[3-6] have shown biochemical properties to be more significant and dependable for their classification and identification. In the list of multiple tests recommended by Gordon and Mihm, major stress has been paid on the decomposition of casein, tyrosine and xanthine. The development and use of biochemical methods for identification of *Nocardia* have greatly facilitated the diagnostic and ecological studies.

During our studies on the incidence of *Nocardia* associated with bronchopulmonary disorders, we modified the tests for the decomposition of casein, tyrosine and xanthine and obtained clear results after 4 days. Medium with the following composition was prepared for casein decomposition. Vitamin-free casein 10 gm., agar 20 gm., distilled water 1000 ml. The casein was initially dissolved in N/10 alcoholic KOH solution, thereafter mixed with agar in distilled water and the volume made upto 1000 ml. Medium was autoclaved at 12 lb. for 15 minutes after adjusting the pH at 7·0. Plates of this medium when inoculated and incubated at 37° C. showed clearing around the inoculum after 2 days in case of casein positive strains.

For tyrosine and xanthine decomposition 0·5% solutions of these were used. One ml. of the 0·5% sterile solution (tyrosine or xanthine) was added to 1 ml. of sterile Sorensen's phosphate buffer pH 7·0, the final 2 ml. solution was inoculated with the suspected strain of *Nocardia* and incubated at 37° C. A parallel control of 2 ml. of buffer pH 7·0 inoculated with the suspected strains was always run. After 4 days, 8 ml. of sterile distilled water and 2 ml. of Nessler's reagent were added to each tube. The development of a deeper yellow colour than the control indicated the positive whereas a colour lighter or similar to the control a negative result for the decomposition of tyrosine and xanthine.

Repeated tests for the decomposition of casein, tyrosine and xanthine performed with 35 strains of *Nocardia asteroides, N. brasiliensis, N. caviæ, Nocardia* spp. and *Streptomyces* spp. with the described method along with that of Gordon and Mihm's gave identical results. Results demonstrate efficacy of the method with definite advantage of obtaining rapid, clear-cut readings using media much simpler to handle and prepare.

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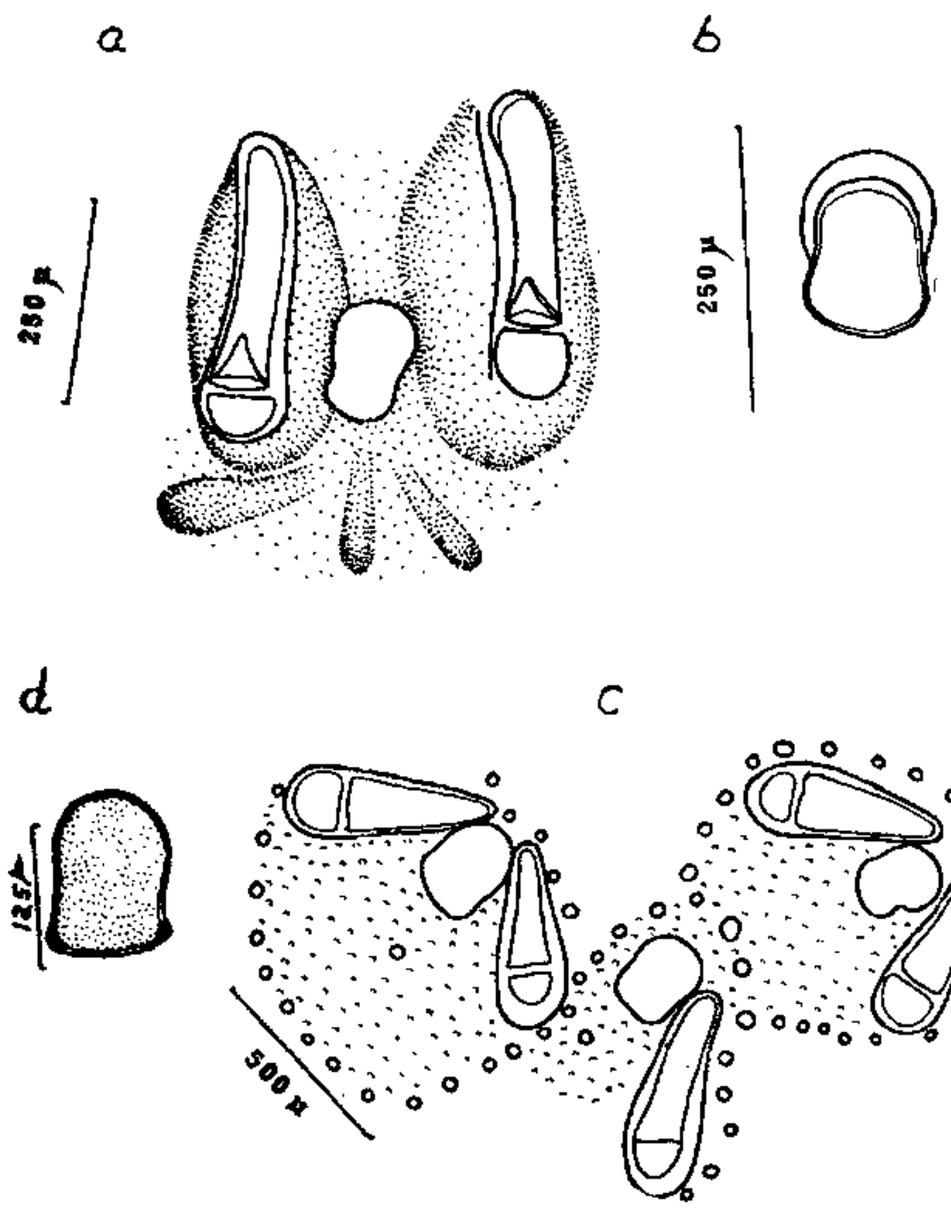
THREE SPECIES OF THE GENUS *TREMOGASTERINA* CANU (ECTOPROCTA) FROM THE INDIAN OCEAN

THREE species of *Tremogasterina* Canu 1911,[1] recorded from the Arabian Sea and the Bay of Bengal at present, were previously collected only from the Gulf of Mexico and the South Atlantic. The different species of the genus have been observed at all depths from 10 m. to 448 m. This bathymetric disposition has as a corollary a geographic distribution. This genus has been observed in the Atlantic, in the Pacific and in the China sea. In the northern hemisphere it does not go beyond the thirty-first parallel and it is therefore, a tropical genus. *Tremogasterina granulata* Canu and Bassler,[2] *T. lanceolata* Canu and Bassler were found

epizoic on corals collected from the Gulf of Mannar and *T. ventricosa* Canu and Bassler epizoic on gastropod shells dredged from the Arabian Sea.

Members of this genus are characterised by an olscyst surmounted by a rugose, pleurocyst, centrally placed reniform pores, each zooecium separated by inter-junctural pores, three to five hollow peristomial spines and hyperstomial ovicells closed by the chitinised operculum.

1. *Tremogasterina granulata* CANU AND BASSLER, 1928 (FIG. 1, *a-b*)



FIGS. 1, *a-b*. Fig. *a*. *Tremogasterina granulata* Canu Bassler Single zooecium; Fig. *b*. Operculum; Fig. *c*. *T. ventricosa* Canu and Bassler Two zooecia; Fig. *d*. Operculum.

Salient features.—Encrusting. Distinct, elongate, elevate zooecia separated by small pores, which may be inconspicuous. Highly calcified and granulated front with a pore in the middle (Fig. 1, *a*). Elongate and sub-orbicular orifice with a concave border. Two cardelles present. Operculum chitinous with a continuous sclerite (Fig. 1, *b*). Large avicularia, placed on calcareous thickenings on either side of the orifice, directed distally. Mandibles long with slightly pointed ends. Three small oral spines present in juvenile zooecia. Length 500 μ and breadth 540 μ.

Remarks.—Calcification owing to age will give the colonies very complicated appearance and the front will be provided with ridges and grooves.

2. *Tremogasterina ventricosa* CANU AND BASSLER, 1928 (FIG. 1, *c-d*)

Salient features.—Zoarium encrusting. Young zooecia distinct, separated by interjunctural pores, which get obscured as a result of calcification. Convex front tuberculated with small reniform pores (Fig. 1, *c*). Aperture elongate oval. Thin peristome with three spines. Avicularia large with rounded tips. Mandible with a sub-marginal sclerite (Fig. 1, *d*). Ovicells not noticed. Length 500 μ and breadth 420 μ.

Remarks.—Only a few zooecia in the present instance have mucros, which are inconspicuous. Discussing, the range of variation in this species Canu and Bassler[2] state that the mucro is inconsistent and may often be wanting. The number of frontal pores vary from one zooecium to another, the beak of the avicularium may be pointed or rounded.

3. *Tremogasterina lanceolata* CANU AND BASSLE, 1928 (FIG. 2, *e-h*)

Salient features.—Zoarium encrusting, multilaminar. Distinct zooecia separated by a line of interjunctural pores (Fig. 2, *e*). Convex front provided with very small granulations. A median pore present. Cardelles small. Large anter and rather small poster. Chitinised, elongated oval operculum with a thin marginal sclerite. Avicularia large, often paired, usually pointed distally or rarely disto-medianly. Immersed ovicells tuberculated, often with a few large tubercles (Fig. 2, *g*). Ovicells closed by the operculum. Length 750 μ and breadth 625 μ.

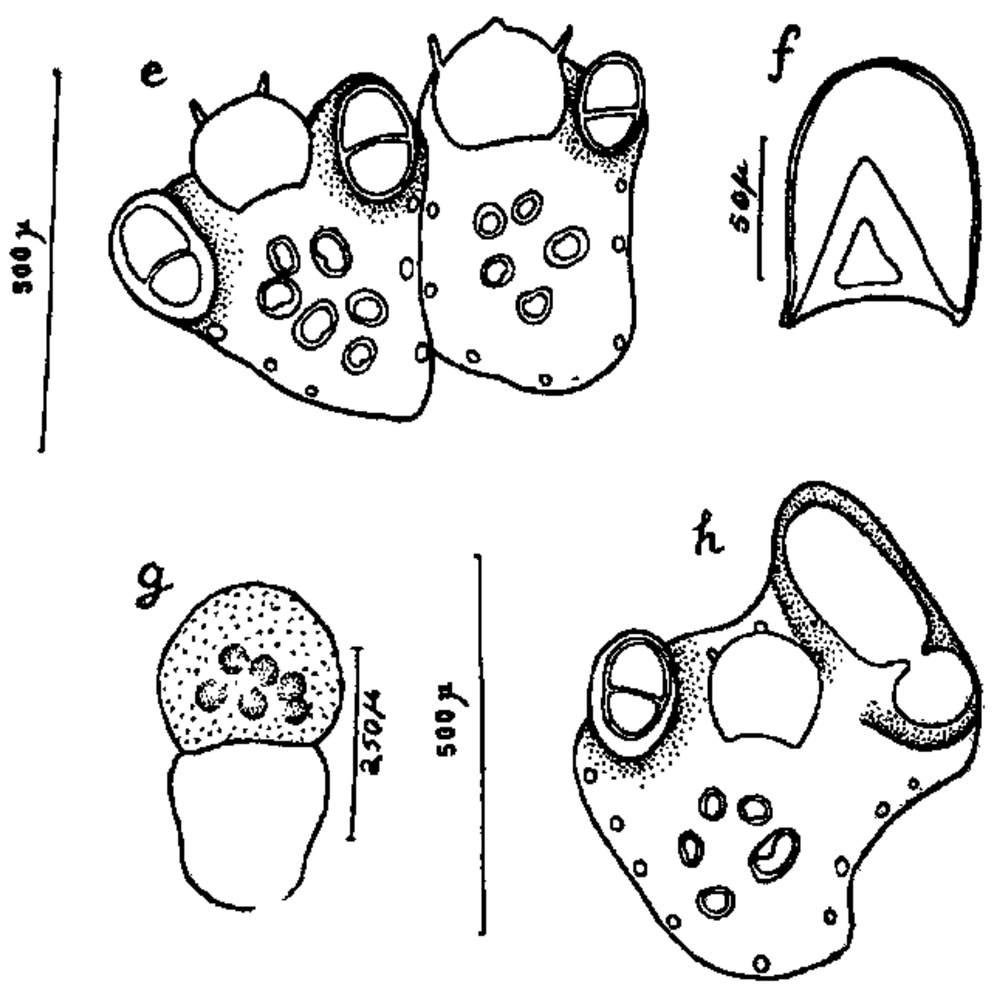


FIG. 2. *e-h*. *Tremogasterina lanceolata*. Fig. *e*, Two zooecia; Fig. *f*. Avicularian mandible; Fig. *g*. Ovicell. Adventitious avicularia.

Remarks.—The calcification of the frontal area makes a detailed study of the species difficult. This form shows some general resemblance to *T. granulata*. The specimens studied by Canu and Bassler were collected from nearly 240 and 261 metres depth, while the present specimens are taken from 10 metres.

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A DILEPIDID CYSTICERCOID FROM *UROMASTIX HARDWICKII* AND ITS EXPERIMENTAL DEVELOPMENT IN PUP

UNDER *Joyeuxiella* Führmann, 1935 (= *Joyeuxia* Lopez-Neyra, 1927) (Dilepididæ : Cyclophyllidea), parasitising carnivorous mammals, *J. chyzeri* (its genotype) and nine other species have been listed[11] while Yamaguti[13] has excluded one species, *J.* sp. Recognising the species included by Yamaguti, Mettrick and Beverley-Burton[5] have described a new species, *J. paucitestis*, from Rusty Spotted Genet.

of these, *J. chyzeri*, *J. führmanni*, *J. pasqualei*, *J. pasqualeiformis*, *J. rossicum* and *J. gervaisi* are recorded in dogs and cats. *J. pasqualei* and *J. echinorhynchoides* have, however, been recognised as the two valid species and the others that had been named are considered as their synonyms.[4,8,12]

Indian reports on the occurrence of *Joyeuxiella*, as compiled[10] and recorded,[1,3,7,9] relate to *J. gervaisi*, *J. chyzeri* and *J. pasqualei*.

Coprophagous insect is believed to act as first intermediate host.[12] Species of the reptilian genera : *Lacerta*, *Hemidactylus*, *Terentola*, *Natrix*, *Coluber*, *Tropidonotus*, *Zamenis*, *Ailurophis*, *Varanus*, *Acanthodactylus*, *Chalcidus*, *Trapelus*, *Stellio*, *Scincus*, *Ptyodactylus*, *Psammophis*, *Cœlopeltis*, *Seps* and *Mabuya* and the mammalian genus *Crocidura* have been referred to[11,13] and recorded[2,6] as the second intermediate hosts for *J. pasqualei* and *J. echniorhynchoides*. In dogs and cats, experimental development of the adults of *J. echinorhynchoides* has been mentioned[11,13] and of *J. pasqualei* recorded in cat.[6]

During examination of 41 specimens of *Uromastix hardwickii* (procured from Agra), liver from four, abdominal muscles in two and the mesentery in one yielded cysticercoids. This larval form, on study, was tentatively identified as belonging to *Joyeuxiella*. Subsequent confirmation was accomplished by feeding experiments undertaken with two clean laboratory-reared pups and a clean laboratory-bred rabbit. Adult cestodes, recovered from the former alone, were found to represent *J. echinorhynchoides*. The cysticercoids and the adults are briefly described and the successful development of the latter recorded.

In the attacked regions, the cysticercoids occurred as white, millet-sized, opapue spots which, after extraction and on mounting on slides, measured 0·844–1·407 mm. × 1·087–1·407 mm. in size. In these preparations, internal structures were not visible. With the pressure of a needle on the coverslip, the excysted juveniles, of elongated form and 1·724–2·391 mm. in length and 0·623–0·957 mm. in maximum width, revealed the characteristic suckers and the armed rostellum. The scolex, though not distinctly demarcated from the rest of the body, measured 0·435–0·753 mm. in maximum width with the rounded suckers of 0·130–0·174 mm. in diameter, and the eversible 0·174–0·333 mm. × 0·101–0·130 mm. sized rostellum carried 20–22 rows of typical hooks of rose-thorn shape which gradually diminished in size in the posterior rows. In the anterior rows, the hooks had 21–28 μ long spine and the basal disc of 11–14 μ diameter. In the last row, the length of the spine was 9–14 μ with the basal disc of 7–11 μ diameter.

Eight cysticercoids were fed to one experimental pup while pieces of the affected livers were administered to the other pup and the rabbit. The first pup, on autopsy conducted on the 14th day of the infection, yielded four maturing specimens including a complete worm. The second pup, that died on 25th day of the infection, yielded 52 worms which were mostly adults. The rabbit, autopsied on 46th day, was free from infection.

The 14–day old complete specimen of 42 mm. length had the scolex of 0·783 mm. in maximum width with the suckers of 0·174 mm. diameter and the rostellum, of 0·246 mm. in length and 0·130 mm. in diameter, carrying 20