On the basis of the above observations, it is suggested that the usage of the term 'Chail' should be restricted only to the more metamorphosed rocks; talcose quartzites, quartz-schists and phyllites of the Chor area where Pilgrim and West first recognised them as a separate unit. With the existing status of geological mapping in this part of Himalaya, it is not possible to say whether or not what has been mapped as Simla slate in the Chakrata area and further east are time equivalents of the Simla slate of Simla.*

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RARE CHIMAEROID AND ELASMOBRANCH FISHES FROM THE CONTINENTAL SLOPE OFF THE WEST COAST OF INDIA*

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ABSTRACT

During exploratory trawling from the upper continental slope in depths between 180 and 450 metres off the West Coast of India, specimens of the Chimæroid fish *Neoharriotta pinnata* (Schnackenbeck) and the rare elasmobranchs *Echinorhinus brucus* (Bonnaterre) and *Atractophorus armatus* Gilchrist have been obtained. All three are new distributional records for Indian Seas and they are described and illustrated.

DURING exploratory trawling from the upper continental slope in depths between 180 and 450 metres carried out by R.V. *VARUNA* and other vessels, several interesting fishes and invertebrates hitherto unknown from Indian Seas have been brought to light. Three such interesting finds are: a chimæroid fish *Neoharriotta pinnata* (Schnackenbeck) (Subclass Holocephali, Family Rhinochimæridæ) and two deep-water sharks, namely *Echinorhinus brucus* (Bonnaterre) (Family Dalatiidæ), and *Atractophorus armatus* Gilchrist (Family Squalidæ). Specimens of *N. pinnata* have hitherto been caught only from the equatorial coast of West Africa and South-West Africa (Smith, 1961). An egg case suspected to be of this species was reported from the south-west coast of India (Balakrishnan, 1963). We have been able to obtain two such egg cases and the present definite record of adults of *N. pinnata* from this area helps to confirm the identification of the egg cases.

E. brucus is known to inhabit deeper waters in the warm seas (Bigelow and Schroeder, 1948; Smith, 1961), while *A. armatus* is known to occur in the deeper waters off Natal Coast and Mozambique (Smith, 1961). Brief diagnosis of each species accompanied by outline drawings are given here to facilitate identification.

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Neoharriotta pinnata (SCHNACKENBECK, 1931), FIG. 1 *a*

Two adult females from 12° 17′ N, 74° 13′ E, depth 360 m, on 24–5–1968; and five juveniles (2 males and 3 females) from 12° 12′ N, 74° 10′ E, depth 396 m, on 24–5–1968, both during R.V. *VARUNA* Cruise 128; two empty egg cases from 10° 53′ N, 75° 08′ E, depth 180–206 m, on 27–4–1968 during R.V. *VARUNA* Cruise 127.

Diagnosis of Adults.—Total length 1125 and 1240 mm. respectively. Head 32·7–33·5, trunk height 33·3–33·7, snout length in front of eye 21·3–23·2, and in front of mouth 18·7–21·1, oblique diameter of eye 3·1–3·6, inter-orbital distance 4·6–4·9, width of gill-opening 5·7–5·8, first predorsal distance 32·6–33·9, second predorsal distance 50·7–51·2, prepectoral distance 33·2–34·6, prepelvic distance 50·1–50·2, preanal distance 71·2–73·0, height of first dorsal fin 11·1–11·5, length of pectoral fin 14·2–14·9, length of pelvic fin 9·9–10·0, length of anal fin 5·7–6·1, length of upper caudal lobe along caudal base 22·1–22·7, and lower caudal base 22·6–22·9% of total length. Weight 3·4 and 4·75 kg. respectively.

Echinorhinus brucus (BONNATERRE, 1788), FIG. 1 *b*

One male, 1620 mm. in total length and 29 kg. in weight from 12° 06′ N, 74° 23′ E, depth 405 m, on 27–7–1968 during R.V. *VARUNA* Cruise 129.

Diagnosis.—Snout 7·4, mouth to tip of snout 8·0, horizontal diameter of eye 2·7, inter-orbital distance 8·9, width of first gill-opening 4·1, fifth gill-opening 6·5, first predorsal distance 63·5, second predorsal distance 70·9, distance from snout to base of caudal (upper) 77·5, prepectoral distance 27·8, prepelvic distance 60·2, snout to first gill-opening 21·0, and to last gill-opening 27·8, vertical height of first dorsal 4·3, and of second dorsal 5·1, length of pelvic fin 15·3, greatest depth of body 17·0, interspace between first and second dorsal 4·9 and of second dorsal and caudal 3·7% in total length. Body covered with tubercles of radiating bony structure, each with a central spine. Tubercles whitish.

Atractophorus armatus GILCHRIST, 1922, FIG. 1 *c*

Seven females, 841 to 943 mm. in total length from 09° 00′ N, 75° 42′ E, depth 329 m. on 12–11–1968 during fishing from M. V. KLAUS SUNNANA.

Diagnosis.—Snout tip to inner nares 4·0–4·6, width of mouth 7·6–8·6, horizontal diameter of eye 5·9–6·2, inter-orbital distance 7·6–9·1, snout tip to spiracle 12·6–16·7, first predorsal 33·5–37·0, second predorsal 68·5–70·5, snout to base of caudal (upper) 71·5–83·7, prepectoral distance 23·9–25·4, prepelvic distance 59·1–61·8, greatest depth of body 13·9–16·0, length of first dorsal spine 5·3–6·6, and of second dorsal spine 3·9–5·2, vertical height of first dorsal 6·4–7·7, of second dorsal 5·3–6·1, interspace between first and second dorsals 24·0–26·6, interspace between second dorsal and caudal base 6·5–7·3, length of pectoral fin from origin to posterior tip 15·8–18·3, and of pelvic fin 10·3–11·4% in total length. Weight 3·25 to 5·50 kg.

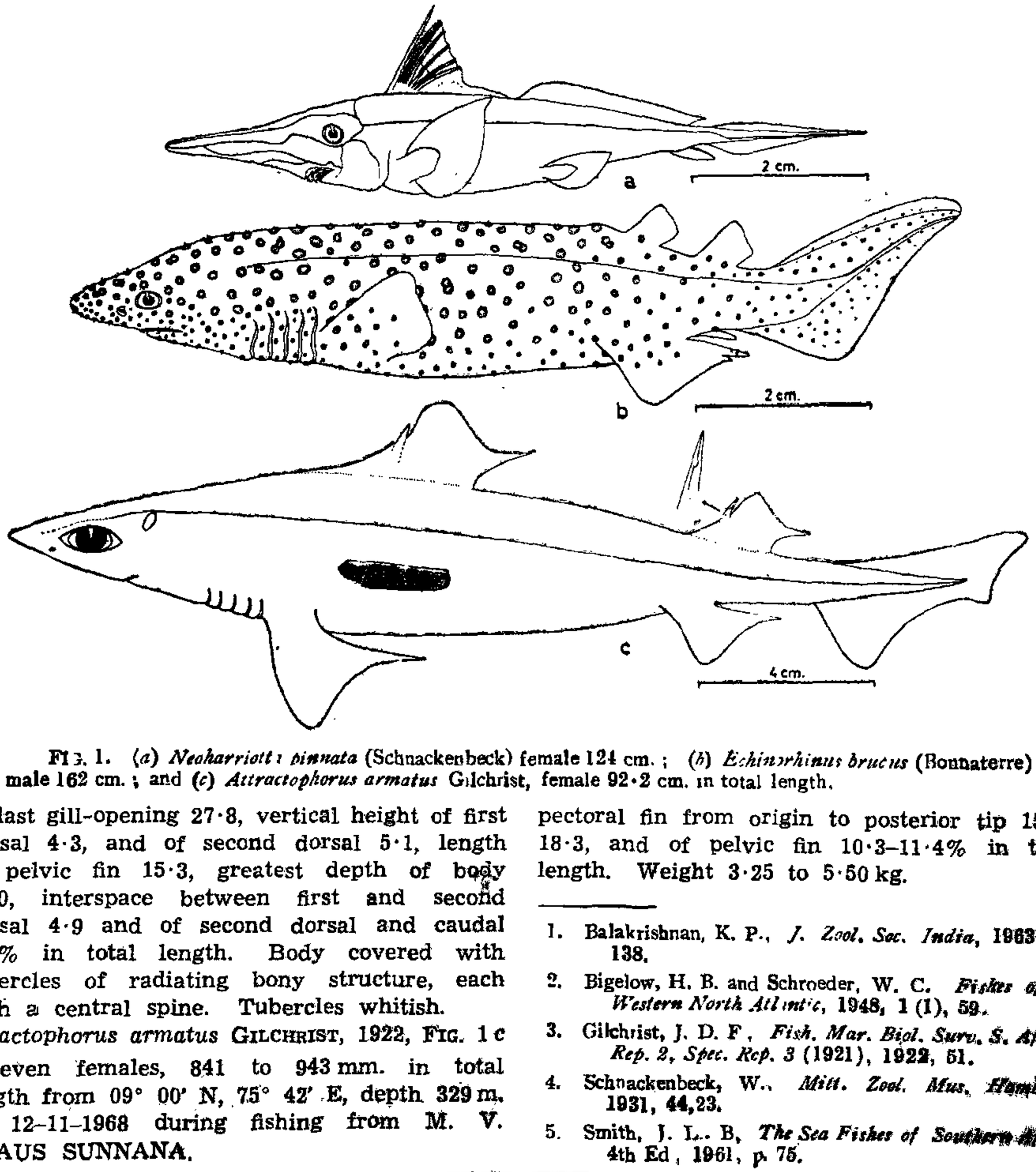

FIG. 1. (*a*) *Neoharriotta pinnata* (Schnackenbeck) female 124 cm.; (*b*) *Echinorhinus brucus* (Bonnaterre) male 162 cm.; and (*c*) *Atractophorus armatus* Gilchrist, female 92·2 cm. in total length.

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