

RECENT RESEARCHES IN PALAEONTOLOGY, PALAEOBOTANY,
AND STRATIGRAPHY IN THE PALAEONTOLOGIC DIVISION,
GEOLOGICAL SURVEY OF INDIA

M. R. SAHNI

Palaeontologist, Geological Survey of India.

THIS note gives a brief summary of various palaeontologic, palaeobotanic and stratigraphic investigations carried out in the Palaeontologic Division of the Geological Survey of India by the author or his colleagues in collaboration with him. The paper on *Indobrachyops panchetensis* gen. et. sp. nov. is jointly with the distinguished vertebrate palaeontologist, Baron F. Von Huene, University of Tübingen, Germany. These papers are being published shortly in the Records Geological Survey of India, Palaeontologia Indica or in the publications of the Palaeontological Society of India, as indicated below.

The papers summarised are :

(i) On *Indobrachyops panchetensis* gen. et. sp. nov., from the Upper Panchets (Lower Trias) of the Raniganj Coalfield, by Baron F. Von Huene and M. R. Sahni.

Detailed description is given of a new Labyrinthodont and the age of the Panchets is discussed. It is suggested that the lower beds of the Panchets may be of U. Permian age, the rest being Triassic.

Generic diagnosis—Skull triangular, slightly broader than long with characters of the Brachyopidae; no otical notch or intertemporal; double condyles, orbits not large, situated at middle of side-length; very large and broad palatal openings; base of skull covered by parasphenoid; pterygoid and palatine very narrow, prequadrate palatal opening relatively small, Choana very small, situated far in front. L. Trias Holotype No. 17754 (*Journ. Pal. Soc. India*, Vol. 3 in Press).

(ii) A fossil reptilian egg from the Uttaturs (Cenomanian) of Southern India, being the first record of a vertebrate fossil egg in India, by M. R. Sahni.

The fossil egg found by the author constitutes the first record of a vertebrate (reptilian) fossil egg in India. While chelonian relationships are suggested, no actual associated remains of this group have been found; on the other hand, Dinosaurian bones are known from the horizon concerned. Exact affinities uncertain. Occurrence, Uttatur stage, Cenomanian, S. Indian Cretaceous. Holotype No. 17755 (*Rec. Geol. Sur. Ind.*, in Press).

(iii) Supplement to a monograph of the Terebratulidae of the British Chalk, by M. R. Sahni.

This embodies the results of examination of about 340 British Chalk Terebratulidae and a few specimens from below the *Uintacrinus* zone of the German Chalk. Except one species, *Concinnithyris rowei* sp. nov. and two varieties *Gibbithyris grandis* var. *nana* nov. and *Gibbithyris ellipsoidalis* var. *quidhamptonensis* nov. all the other forms described are referable to known forms. *Concinnithyris rowei* is a small, pentagonal, uniplicate form with massive, epithyrid beak and large foramen. *Gibbithyris grandis* var. *nana* and *Gibbithyris ellipsoidalis* var. *quidhamptonensis* are identical with the respective species except for their diminutive size. The following list includes the remaining species described in this paper which embodies diagnostic emendations and revised stratigraphic ranges of several known

forms—*Concinnithyris subundata* sp. indet. *Terebratula buplicata*, *C. albensis* var. *latifrons*, *C. albensis* var. *minor*, 'Concinnithyris sp. indet. aff. *albensis*, *C. protobesa*; *Gibbithyris grandis*, *G. media*, *G. ellipsoidalis*, *G. gibba*, *G. subrotunda*, *G. semiglobosa*; *Chatwinothyris subcardinalis*; *Carneithyris gracilis*, *Carn. carnea*, *Terebratula* gen. et. sp. indet; *Neoliothyryna obesa*; *Ornatothyris sulcifera*.

The work supports the earlier basis of classification of the Chalk Terebratulids proposed by the author in his monograph (*Palaeontogr. Soc., London, 1929*). It suggests wider limits for species variation than accepted hitherto, and extends the stratigraphic range of several forms. (*Monographs, Palaeontological Society of India, Vol. I, No. 1., in Press*).

(iv) *Revision of the Cretaceous Terebratulidae of Southern India with description of two species from the East Coast Gondwanas*, by M. R. Sahni.

The investigation suggests that (a) the accepted limits of the Cenomanian, Turonian and Senonian of the S. Indian Cretaceous need substantial emendation; (b) the known horizons of certain species are, by comparison with those of related European species somewhat unexpected; (c) the Albian is probably represented; (d) the East Coast Gondwanas appear to be a coastal facies of the lowermost known Cretaceous of the region; (e) though several European genera are represented, identity of species is not so common as Stoliczka believed; (f) variations in species suggest that certain generic diagnoses need emendation.

The following genera and species are described, and emendation to diagnoses of genera and species given where necessary.

Genus *Rectithyris* Sahni 1929.

1. *Rectithyris expansa* sp. nov. Shell very wide, beak straight; wide area below beak ridges; foramen large; brachial valve much flatter than pedicle; *Holotype* No. 17706; Budavada, U. Gondwanas.

2. *Rectithyris recurvata* sp. nov. Shell of moderate size; as wide as long, ventrally inflated; growth stages prominent; beak

ridges strong; margin of pedicle valve recurved anteriorly; *Holotype* No. 17709; Budavada, Upper Gondwanas.

Genus *Concinnithyris* Sahni 1929.

3. *Concinnithyris ootatoorensis* (Stoliczka) 1872: *Lectotype* No. 1582; Utattur stage (Cenomanian);

4. *Concinnithyris indoalbensis* sp. nov.—Shell large, smooth, oval, uniplicate; anterior margin insinuated; beak massive, short; foramen large, obliquely truncated, slightly labiate. Beak ridges absent. *Lectotype* No. 1557, Utattur stage (Cenomanian).

5. *Concinnithyris rectithyroides* sp. nov.—Shell medium sized, triangular, subdepressed, brachial valve gently convex; anterior median depression shallow, no distinct lateral plicae; pedicle valve with low, broad folds and subdued sulci. *Holotype* no. 17712.

6. *Concinnithyris andurensis* sp. nov.—Shell large, smooth, relatively depressed; subpentagonal or oval; beak rounded, short, incurved; foramen wide, short; wide sulcus anteriorly in brachial valve. *Lectotype* No. 1553. Trichinopoly stage (Turonian) to Arriyalur stage (Senonian).

7. *Concinnithyris andurensis* var. *brevirostris* nov.—Shell oval; beak obliquely truncated, short; ventral plication strong. Figured specimen no. 17714; basal Trichinopoly to Upper Arriyalur stage (Senonian).

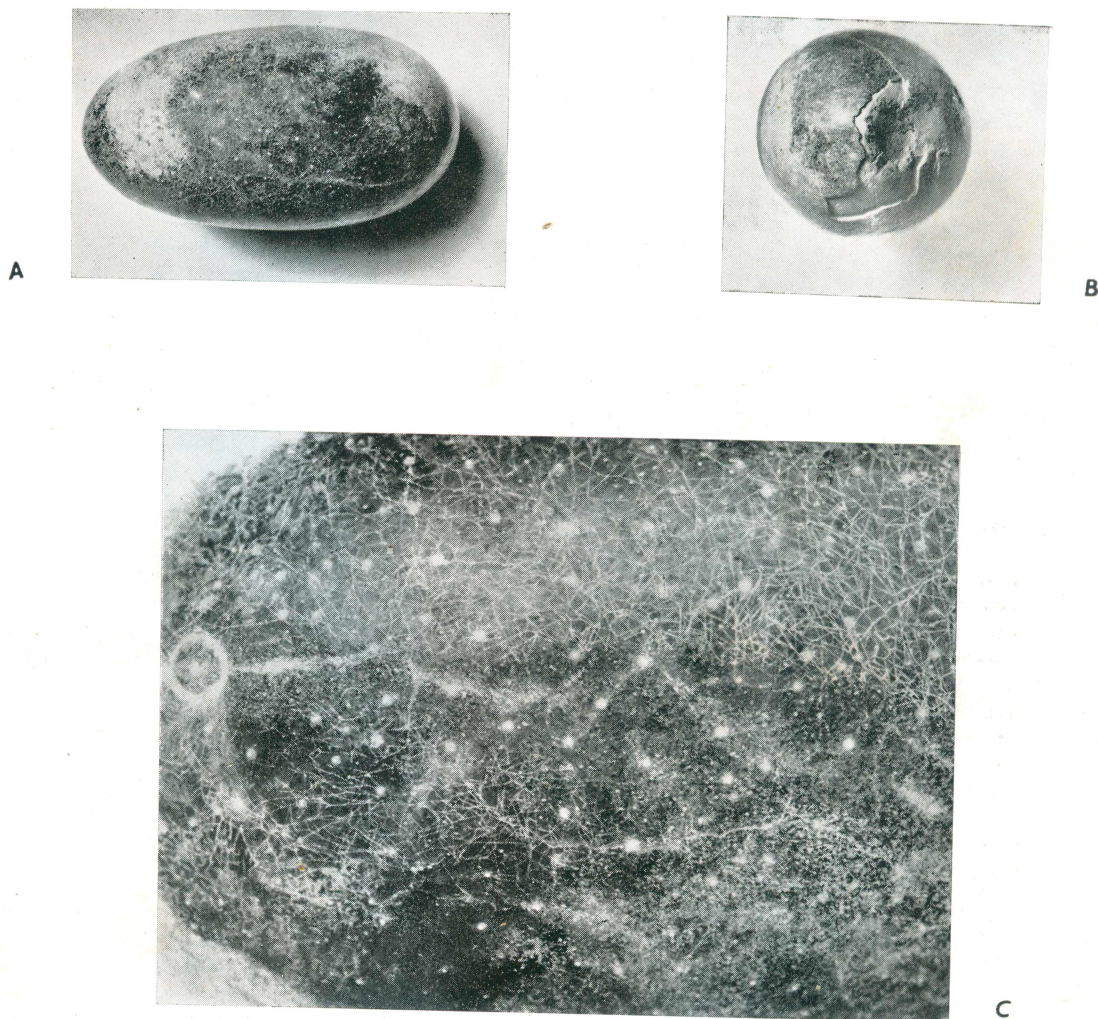
8. *Concinnithyris obesa* (Sow.) 1872; *Plesiotype* No. 1539, Arriyalur stage (Senonian).

9. *Concinnithyris acutiplicata* sp. nov.—Shell medium sized, elongate, beak massive, well curved, foramen moderate; beak ridges absent, pedicle valve strongly arcuate with strong median fold separating deep, subparallel furrows; brachial valve comparatively flat with strong plications; cardinal processes flat and platelike; *Holotype* No. 17717, Arriyalur stage (Senonian).

10. *Terebratula* (? *Concinnithyris*) *arabillis* Forbes, 1846; *Holotype* probably in British Museum; Arriyalur stage (Senonian)

11. *Rectithyris odiumensis* sp. nov.—Shell subcircular, beak comparatively short, narrow and curved. Foramen quadrate, ? reformate; symphytium narrow towards the top, forming only a small part of foraminal

¹ The Palaeontological Society of India is bringing out a new serial publication, namely, "Monographs" which will, as a rule, include the longer articles, or papers of special interest.



Photos, University of Tübingen W. Germany, through courtesy Baron F. von Huene.

Text fig. 1. Fossil reptilian egg from the Utattur stage (Cenomanian) of Southern India. A. lateral view. Nat size. B. View of wider end showing a pit (shaded area due to injury sustained *before* fossilisation. Nat size). C. surface showing light-coloured spots, Enlarged $\times 4$. (Collected by M. R. Sahni. Repository, Geological Survey of India)

circumference; *Lectotype* No. 1518; *Utattur stage* (Cenomanian) and *Arriyalur stage* (Senonian).

12. *Rectithyrus subdepressa* (Stoliczka) 1872; *Lectotype* No. 1535. *Arriyalur stage* (Senonian).

13. *Rectithyrus ovalis* sp. nov.—Shell large, depressed, perfectly oval; beak spread out, short, moderately incurved; foramen large, reformat; beak ridges well defined, mesothyrus. Anterior commissure of the pedicle valve broken by an upward insinuation but no evidence of fold or sinus; *Holotype* No. 17727; *Arriyalur stage* (Senonian).

14. *Rectithyrus rotunda* sp. nov.—Shell massive, rotund, as wide as long; beak massive, straight, terminated by a large vertically placed foramen; beak ridges distinct, mesothyrus; brachial valve margin recurved, forming a large flat area anteriorly and a fairly deep furrow laterally; *Holotype* No. 17729. *Arriyalur stage* (Senonian).

Genus *Moraviaturia* gen. nov.—Genotype *Terebratula diphimorpha* Stoliczka 1872. *Generic diagnosis* as for Genotype.

15. *Moraviaturia diphimorpha* (Stol.).—Shell massive, laterally extended, wider than long, growth stages prominent anteriorly, sometime becoming step-like as in *Ornatithyrus sulcifera* (Morris); beak large, massive, incurved, foramen large, with a labiate tendency. No beak ridges. Brachial valve very slightly convex, distinct sulcation present. Valve margin recurved inwards. Pedicle valve moderately convex near the umbonal region; anterior margin of pedicle valve turned at right angles to form a flat junction with the corresponding recurved dorsal valve. Lateral furrow deep, formed due to the inturning of the lateral margins of the valve, flattens out anteriorly. Radial striations distinct. *Geno-Lectotype* No. 1585 *Loc.* Moraviatur. *Range.*—Utattur stage.

16. *Terebratula purii* sp. nov.—Shell medium sized, ovate, subpentagonal, beak ridges indistinct, epithyrus; foramen small delitidial plates indistinct. *Lectotype* No. 1581. *Utattur stage* (Cenomanian).

Genus *Neoliothyria* Sahni 1929.

Neoliothyria depressa sp. nov.—Shell large, subpentagonal, depressed, irregularly striated, biplicate; beak incurved, beak ridges strong, permesothyrus; foramen of medium size.

Holotype No. 17731. *Lower Arriyalur stage* (Senonian).

18. *Neoliothyria depressa* sp. nov. var *Karapaudiensis*.—Shell small sized, uniplicate; Figured specimen No. 1543; *Trichinopoly stage* (Turonian) to *Arriyalur stage* (Senonian).

19. *Neoliothyria flabellata* sp. nov.—Shell medium sized, subtriangular to elongate-subpentagonal; beak massive, permesothyrus, beak ridges well defined, foremen large, reformat. Brachial valve pinched anteriorly; no clearly defined fold or sinus; *Holotype* No. 17732; *Lower Arriyalur stage* (Senonian).

20. *Neoliothyria? elongata* sp. nov.—Shell elongate or subpentagonal, dorsally flattened, uniplicate, beak massive, over-hanging; foramen large; beak ridges permesothyrus, well defined; *Holotype* No. 17738. *Lower Arriyalur stage* (Senonian).

21. *Neoliothyria gracilis* sp. nov.—Shell pod-shaped, narrow, elongate, anteriorly produced; beak small, over-hanging; beak ridges strong, permesothyrus; brachial valve with a shallow median sulcus and ? inconspicuous plicae; *Holotype* No. 17741; *Arriyalur stage* (Senonian).

22. *Neoliothyria? arriyalurica* sp. nov.—Shell smooth, depressed, oval-subpentagonal with thickening near umbonal region; beak short, incurved; foramen large; beak ridges strong, permesothyrus. Muscle scars elongate, narrow, divergent; *Holotype* No. 17743. *Arriyalur stage* (Senonian).

23. *Neoliothyria? mulurensis* sp. nov.—Shell large, depressed, oval to subcircular, incipiently biplicate; beak permesothyrus, short, moderately incurved; umbonal region abruptly convex; *Lectotype* No. 1573; *Arriyalur stage* (Senonian).

24. *Neoliothyria olapaudiensis* sp. nov.—Shell narrow, elongate, oval, smooth, punctate; anterior margin with well produced uniplica. Beak permesothyrus; *Lectotype* No. 1536; horizon doubtful, *Utattur stage* (Cenomanian) or *Arriyalur stage* (Senonian).

Genus *Gibbithyrus* Sahni 1925.

25. *Gibbithyrus indica* sp. nov.—Shell large, subdepressed, broadly ovate; close-set punctae along ventral median line; beak short, incurved, beak ridges indistinct, epithyrus;

dorsal sulcus broad and shallow, flanked by fairly well defined plicae; pedicle valve with wide, low plicae separated by shallow sulci; *Lectotype* No. 1572. *Trichinopoly* stage (Turonian) to *Arriyalur* stage (Senonian).

26. *Gibbithyris* cf. *hibernica* Davidson 1852 (see also *Plesiotype* No. 1562; *Arriyalur* stage (Senonian)).

27. *Gibbithyris carneiformis* sp. nov.—Shell oval, equally biconvex; beak short, incurved; foramen small; *Lectotype* No. 1577. *Trichinopoly* stage (Turonian) to *Arriyalur* stage (Senonian). (*Palaeontologia Indica*, in Press.)

(v) *Argentine and Australian affinities in a Lower Permian fauna from Manendragarh, Central India* by M. R. Sahni and D. K. Dutta.

A Lower Permian fauna containing *Eurydesma* and other fossils is described. Relationships and general association suggest affinities with the L. Permian faunas of Argentine and Australia. The following species are recorded :—

1. *Eurydesma hesdoensis* sp. nov.—Shell broadly oval, strongly convex; umbones subcentral pointed, prosogyrate, slightly incurved; lunule deep; hinge short, narrow; elongate resilifer; *Holotype* No. 17736.

2. *Eurydesma manendragarhensis* sp. nov.—Distinguished from *E. mytiloides*, Reed, by its shorter dorsal margin, subcordate and shorter lunule, almost central instead of subanterior umbones; *Holotype* No. 17737.

3. *Spirifer hesdoensis* sp. nov.—Shell semicircular to subtriangular, cardinal angles subacute, ventral valve with a prominent sulcus; 8 to 10 prominent ribs whose intersection with concentric lamellae forms rectangular areas, characteristic of the species; *Holotype* No. 17750.

4. *Euomphalus hesdoensis* sp. nov.—Shell almost circular, depressed, three to four whorls; spire keeled, umbilicus feeble; shell surface uneven producing a more or less broad rib-like structure which is characteristic; *Holotype* No. 17747, *Paratype* No. 17748.

The other species recorded are : *Aviculopecten squamuliferus* Morris Nos. 17742, 17743 (Australia); *Aviculopecten mitchelli*, Etheridge and Dunn, No. 17744 (Australia); *Eurydesma hobartense* (Johnston) Nos. 17738,

17739 (Argentina, Australia); *Eurydesma playfordi* Dickens. Nos. 17740, 17741 (Australia); *Liopteria ? dutoiti* Harrington; No. 17745 (Argentina); *Euomphalus* cf. *occlusus* J. D. Sowerby, No. 17746 (Australia); *Pleurotomaria umariensis* Reed; No. 17749; *Protoretapora* cf. *ampla* Lonsdale; No. 17752 (Australia, etc.) *Crinoidal* plate, No. 17753. (*Rec. Geo. Sur. Ind.*, in Press).

(vi) *Freshwater Mollusca and Plant remains from the Tertiaries of Kargil, Kashmir* by M. R. Sahni and N. C. Bhatnagar.

The mollusca are closely related to Eocene forms. The palm *Sabal* indicates a post Cretaceous age. Tentatively an Eocene age is assigned to these fossils. All specimens are from Kargil, Kashmir. The species described are :—

1. *Unio kohlii* sp. nov.—Shell quadrate with concentric striations, length greater than height, rounded anteriorly and posteriorly. Umbones inconspicuous; *Holotype* 17690.

2. *Melania kargilensis* sp. nov.—Shell turreted; spire narrows rapidly, whorls high, 6-7 in number, cancellate, with prominent spiral lines and 8-10 well defined, occasionally nodose, ribs; *Holotype* No. 17692.

3. *Viviparus* sp. indet.—subglobular, body whorl large, spire short, three whorls, aperture holostomatous; figured specimen No. 17698.

4. *Planorbis* sp. indet.—figured specimen No. 17689.

5. *Sabal* sp. indet; figured specimens Nos. 17700 and 17701. (*Rec. Geol. Sur. Ind.*, in Press).

(vii) *The Gondwana System, suggestions for a revised classification* by M. R. Sahni and C. Nageswara Rao.

The authors discuss the merits of the two-fold and three-fold classification of the Gondwana system and come to the conclusion that neither of these can be regarded as truly scientific on the basis of available data. Some of the Gondwanas referred to the Jurassic are undoubtedly of U. Triassic age, both on evidence of vertebrate fossils (*Ceratodus*) and freshwater mollusca, genus *Tihkia*, Sahni and Tewari. Certain strata in the Talcheer Coalfield of Orissa, referred

to the Mahadevas contain *Glossopteris*, and so need revision. It is therefore preferable, in the opinion of the authors, to correlate the different Gondwana rocks with the subdivisions of the Standard stratigraphic scale without referring them to subdivisions, either of the two-fold or three-fold classification.

A complete revision of the Gondwana system is therefore called for. (*Rec. Geol. Sur. Ind.*, in press).

(viii) *On the occurrence of Microspores of Vascular Plants in the Cuddappah sediments (Pre-Cambrian) of Jonk River Section, Raichur district, Madhya Pradesh, India*, by M. R. Sahni and R. N. Shrivastava.

The presence of spores of the *Lycopside* and the *Sphenopsida* in the Cuddappah sediments confirms the conclusion that vascular plants had already originated in Pre-Vindhyan times, unless the age of the Cuddappas of this area is to be raised to the Vindhyan. (*Records. Geol. Sur. Ind.*, in Press).

(ix) *Other Research investigations.*

In addition to the foregoing monographs and shorter papers now in the press, a number of research investigations carried out in the Palaontologic Division of the Geological Survey of India as a part of the training programme are nearing completion. The field work by The Geological Survey of India party, connected with the Panchet tetrapods (vide below) was carried out under the

author's direction during December, 1957 and January and part of February, 1958, and has resulted in the discovery of several skulls of *Lystrosaurus* and other fossils, the first recorded skull of *Lystrosaurus* being discovered by the youngest member of the party, P.P. Satsanghi.

The investigations include the following items :—

M. R. Sahni and M. V. A. Sastry : *Triassic fossils from Mansarowar*; M. R. Sahni and R. N. Shrivastava : *Taxonomic study of fossil wood from Singrauli coalfields*; M. R. Sahni and A. P. Tewari : (a) *Permo-Carboniferous fossils from Spiti*; (b) *Palaeozoic and Mesozoic fossils from Ladakh*; M. R. Sahni and K. K. Varma : (a) *Lower Palaeozoic fossils from Spiti*; (b) *Jurassic brachiopoda from Jaisalmer*; M. R. Sahni, K. K. Varma and A. Mitra : *Statistical study of the Jurassic rhynchonellid (R. verticinalis Kitchin) from Jaisalmer*; C. Tripathi : *Permo-Triassic tetrapods from the Panchets of the Raniganj coalfield area (Pachygonia incurvata, Lystrosaurus, Thecodonts etc.)*; P. P. Satsanghi : *Sivalik mammals from the Chinji and Simla hills*; R. N. Shrivastava, A. Chandra and P. C. Mehrotra : *Palynological studies of the Gondwana coals*; R. N. Shrivastava : *Tertiary microflora from Ponneri (Madras)*; R. N. Shrivastava and P. C. Mehrotra, *Microfloral study of the Tertiary rocks of Sivilimedu, district Chingleput (Madras)*; V. V. Sastri, S. C. Pant and H. M. Kapoor : *Jurassic Foraminifera and Ostracoda from Jaisalmer*; A. K. Chatterjee : *Eocene larger foraminifera from Jaisalmer*.