III NOTES ON THE FAUNA OF PARESNATH HILL, WESTERN BENGAL

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Parésnath Hill, the highest mountain in Bengal apart from the Himalayas, is situated in the district of Hazaribagh (Chota Nagpur) and is separated from the foot-hills of Nepal by a distance of about 180 miles in which the whole width of the Ganges valley is included. Isolated to a considerable extent from the other, lower hills and ridges of the district, the mountain rises to a height of 4,800 feet above sea-level. Its flanks and crest are covered with dense jungle which periodical forest fires prevent from reaching any great height, and its atmosphere though damper (at any rate near the summit) than the atmosphere of the surrounding country owing to the clouds which it attracts, does not possess the humidity of that of the Eastern Himalayas, resembling rather that of the slopes below Naini Tal in Kumaon.

The fauna of Parésnath has hitherto received little attention, although Blanford and Stoliczka collected molluscs, crustacea and lizards upon it many years ago. The following notes are based mainly on collections made by Dr. J Travis Jenkins and myself in April and May, 1909.

I.—A LIST OF SPECIES IDENTIFIED.

*(The names of the species as yet known only from Parésnath are marked with a *.)*

MOLLUSCS.

The land molluscs of Parésnath exhibit a tendency to form separate species and races such as usually occur in isolated areas of a mountainous nature.

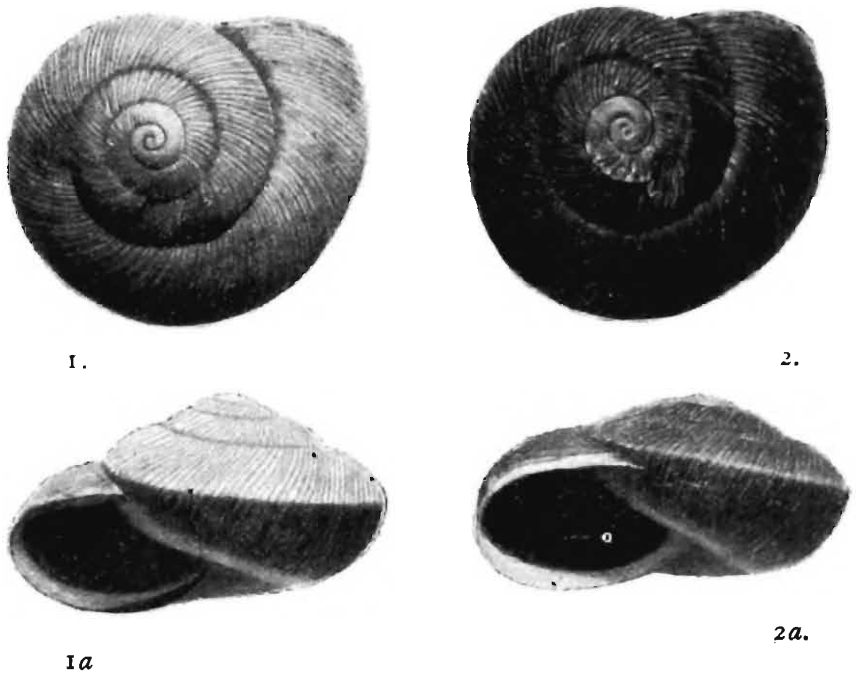
Family ZONITIDAE.

1. *Ariophanta interrupta* (Bs.) subsp. *sacra.*, nov.

Blanford and *Godwin-Austen, Fauna Brit. Ind.*—Moll., i, p. 31.

As is pointed out by the authors cited, Parésnath shells of this species represent a local race distinguished from the typical

form by its larger size (on an average) and greater depression (maximum breadth 34 mm., depth 17 mm.). I found several dead specimens of this shell on the northern slope of the hill at different altitudes and there are others in the Indian Museum from Stoliczka's collection. The typical form is widely distributed in Bengal, the northern part of the Madras Presidency and Central India.



FIGS. 1, 2.—Shells of *Ariophanta interrupta.*

Figs. 1, 1a.—An unusually large (somewhat faded) specimen of the typical form from Calcutta.

,, 2, 2a.—Type of the race *sacra* from Parésnath.

(Both the figures are slightly magnified, to the same extent.)

2. *Macrochlamys sacrata*,* G. A.

Godwin-Austen, Land and Freshwater Moll. Ind., ii, p. 244, pl. cxxviii, fig. 3, pl. cxxix, fig. 4.

This snail, which was doubtfully attributed to *M. lecythis* (a species found on the Rajmahal Hills) by Stoliczka, is apparently endemic on Parésnath. I found numerous individuals, most of them immature, on the north side of the hill at altitudes of from 4,000 to 4,500 feet. They were aestivating under stones at the time of my visit (April, 1910) and had their shells closed by a wad of dried slime, but on being brought into the moister climate of Calcutta they resumed active life.

3. *Macrochlamys perplana*, G. A. (Nevill MS.).

Blanford and *Godwin-Austen, Fauna Brit. Ind.*—Moll., i, p. 99.

Numerous specimens of this snail were found together with those of *M. sacrata* in similar circumstances and condition. The

species is also known from Manbhum and Panchet Hill near Raniganj in Bengal.

4. *Microcyrtina cryptomphalus*,* G. A.

Blanford and *Godwin-Austen*, *op. cit.*, p. 257.

We did not take this shell, which was obtained on Parésnath at an altitude of 4,480 feet.

5. *Kaliella barrakporensis* (Pfr.).

Blanford and *Godwin-Austen*, *op. cit.*, p. 258.

Specimens of this widely distributed species were obtained on Parésnath by Stoliczka and also by myself. My specimens were taken on the north side at an altitude of 4,350 feet. *K. barrakporensis*, which occurs practically all over Peninsular India and also in Madagascar, is not uncommon in pine-woods round Simla at altitudes of 7,000—8000 feet.

Family HELICIDAE.

6. *Glessula praelustris* (Bs.).

Hanby and *Theobald*, *Conch. Ind.*, p. 9, pl. xvii, p. 6.

Some dead and partly incinerated shells of this species were found among the ashes of a jungle fire under a stone on one of the ridges of the hill (alt. 4,000—4,500 feet) and have been identified for me by Col. Godwin-Austen, to whom I am indebted also for confirmation of the other identifications of the land shells here recorded. *G. praelustris* is also known from Orissa.

Family CYRENIDAE.

7. *Pisidium* prox. *atkinsonianum*, Theob.

In a small spring situated on the north side of the hill at an altitude of about 4,000 feet I found numerous specimens of a minute *Pisidium* which my friend Mr. G. H. Tipper has examined. He informs me that they resemble specimens of *P. atkinsonianum* from Gangtok in Sikhim so closely that they should probably be regarded as representing a local race of that species. They differ considerably from *P. clarkianum*, Nevill, the common species of the plains of Bengal.

EARTHWORMS.

Dr. W Michaelsen writes as regards the earthworms collected on Parésnath:—

"Unfortunately none of them is quite mature. In consequence I can only partially determine them, hardly being able to denominate the genus.

"'The worms' from a small stream' [Sita Nullah, on the lower slopes of the hill] belong to two species, the larger being a '*Glyphidrilus* sp.' (perhaps the same as that from the Himalaya, which was not determinable) and two specimens of an Ocnerodrilid with one gizzard, *viz.*, a *Gordiodrilus* or a *Kerria*. The worms 'from mud at the edge of small spring' [alt. *ca.* 4,000 feet] belong to *Perionyx* or *Perionychella* (probably *Perionyx excavatus*, E. Perr., which is so often found immature and so widely distributed)."

At the time Dr. Michaelsen wrote this note only one species of Microchaetinae had been recorded from India, namely an indeterminable young form of *Glyphidrilus* from the Simla Himalayas. More recently he has described the same or an allied species, from mature specimens taken in the plains of Travancore, under the name *G. annandalei*.[1]

CRUSTACEA.

Family POTAMONIDAE.

Paratelphusa (*Barytelphusa*) *jaquemontii*, Rthbn.

Alcock, Cat. Ind. Dec. Crust., i (fasc. ii)—Potamonidae, p. 79, pl. xii, fig. 55.

There are numerous specimens in our collection obtained on Parésnath by Stoliczka, and I found several myself in the small spring (alt. *ca.* 4,000 feet) to which allusion has already been made. They were unusually small although apparently adult. *P. jacquemontii* is widely distributed in Peninsular India but appears to be rather commoner in the western and the southern districts than in Bengal.

Family PALAEMONIDAE.

Palaemon (*Brachycarpus*), sp.

In a jungle stream running down the north slope of the hill and known as Sita Nullah I found, at an altitude of about 2,000 feet, numerous specimens of a small prawn belonging to the subgenus indicated. It is remarkable for its dark green, almost black colour and has the thick-set appearance often possessed by prawns of the genus from mountain streams. The species is probably undescribed as yet but, should this prove to be the case, will be described later by Mr. S. W Kemp. It appears to differ considerably from the species common at similar altitudes in jungle streams in the Darjiling district, but may be identical with one that occurs in the R. Tista at Jalpaiguri.

A few terrestrial isopods were also obtained but have not been identified.

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[1] "Die Oligochätenfauna der vorderindisch-ceylonischen Region," *Abh. Naturwis. Verein Hamburg*, xix, Heft 5 (1910), p. 89.

MYRIAPODA and ARACHNIDA.

Family SCOLOPENDRIDAE.

Cormocephalus dentipes, Poc.

A specimen of this scarce species, which is only known from Bengal,[1] was taken at an altitude of about 4,300 feet under a stone. The only other specimen in our collection is from Calcutta.

Family GALEODIDAE.

Galeodes orientalis, Stoliczka.

Pocock, Fauna Brit. Ind.—Arachnida, p. 138, fig. 48.

A single specimen was taken under a stone at an altitude of between 4,000 and 4,500 feet. This species is perhaps the most widely distributed of the North Indian Solifugae. It was originally described from Central Bengal and Delhi and specimens in the collection of the Indian Museum prove that its range extends all over the drier parts of northern India from Cutch to the W Himalayas and to Assam. A subspecies (*rufulus*, Poc.), distinguished chiefly by its darker coloration, occurs in Bombay. *G. orientalis* is common in a house situated near Giridih some miles from the base of Parésnath.

Several spiders and millipedes were also collected but have not yet been identified.

INSECTS.

ORTHOPTERA.

Small Acridiids, mantises and cockroaches are common on Parésnath, but the only Orthopteron identified with certainty is the large and powerful grasshopper *Mecopoda elongata* (Linn.), a species found throughout the Oriental region and also in Japan and Australia. In India it is common among brushwood on hillsides whereon the jungle is dense. The elytra of the two forms, a green form and brown one, closely resemble leaves in different stages of decay. Both were found in April on Parésnath.

HYMENOPTERA.

Only the Aculeate specimens in the collection have as yet been examined. Of these Mr. C. A. Paiva has identified those that represent species described in the late Col. Bingham's volumes in the "Fauna," but there are also a considerable number which represent forms not described in these volumes and probably new to science. The following have been identified:—

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[1] Gravely, *Rec. Ind. Mus.*, v, p. 171.

Family SCOLIIDAE.

1. *Myzine petiolata*, Smith.

One specimen taken at an altitude of between 4,000 and 4,400 feet (15-iv-09). A rare species recorded by Bingham from Barrackpore near Calcutta.

Family POMPILIDAE.

2. *Pseudogenia tincta* (Smith).

Two specimens (10 and 15-iv-09) taken at an altitude of between 4,300 and 4,400 feet. A rare species in the plains of Bengal but also recorded from the "North-West Provinces," Sikhim and Burma.

3. *Pseudogenia alaris* (Sauss.).

One specimen from an altitude of between 4,000 and 4,400 feet (12-iv-09). There is a specimen in our collection from the environs of Calcutta (24-viii-04) and the species has been recorded from Sikhim, Burma and Ceylon.

4. *Salius madraspatanus.*

One specimen (4,000 to 4,400 feet, 13-iv-09). The species is common all over the Indian Empire and in Ceylon.

Family SPHEGIDAE.

5. *Sceliphron violaceum* (Fabr.).

Parésnath, 4,400 feet (11-iv-09). Another common species, its range extending from S. Europe to Australia.

6. *Sphex umbrosus*, Christ.

Parésnath, 3,000 feet (15-iv-09). Also a common species, ranging all over the Oriental region and to Japan, Australia and Africa.

7. *Sphex aurulentus* var. *ferrugineus*, Lepel.

Parésnath, 4,000 feet (9-iv-09). Another common form; widely distributed in the Oriental region and found in China and N. Australia.

8. *Cerceris unifasciata*, Smith.

A specimen from Parésnath differs somewhat in colour from specimens from Assam and may represent a distinct variety or a local race. The species occurs in Sikhim, Assam, Upper Burma and China and also in Calcutta. It appears to be found chiefly in mountainous regions but probably not at great or even considerable altitudes.

Family EUMENIDAE.

9. *Eumenes flavopicta*, Blanch.

Parésnath, 4,000—4,400 feet (12-iv-09). A common species throughout Peninsular India, Burma, Ceylon and the Malay Archipelago, but not a mountain species.

10. *Rhynchium brunneum* (Fabr.).

Parésnath, 4,300 feet (10-iv-09). Also a common and widely distributed species; found on the lower slopes of the Himalayas but apparently not at great altitudes.

11. *Rhynchium metallicum*, Sauss.

Parésnath, 4,000—4,400 feet. Widely distributed in India and Burma. The Indian Museum possesses specimens from Karachi, Sind; Lucknow; Oncha Gaon, base of W. Himalayas; Siliguri, base of E. Himalayas; Dalsingh Serai, N. Bengal; Ranchi, Chota Nagpur; Margherita and Sibsagar, Assam; Sikhim; Bangalore, Mysore State, S. India; Maymyo Road, Upper Burma; Mergui, Lower Burma, and Perak, Malay Peninsula. Apparently not a mountain species.

12. *Odynerus bipustulatus*, Sauss.

Parésnath, 4,000—4,400 feet (13-iv-09). Widely distributed in N. India, Assam and Burma. The Indian Museum possesses specimens from Calcutta and Manipur.

Family VESPIDAE.

13. *Icaria ferruginea* (Fabr.).

Parésnath, 4,000—4,400 feet (10—14-iv-09). A common species in Sind, Bombay, the United Provinces, Bengal, Mysore, Madras, Burma and the Malay Peninsula. In the Himalayas only found at low altitudes.

Family COLLETIDAE.

14. *Prosopis mixta*, Smith.

Parésnath, 4,000—4,400 feet (13-iv-09). Bingham gives the habitat as "India" but there is in the Indian Museum a specimen collected by him at Shwegyin in Tenasserim.

15. *Prosopis strenua*, Cam.

Parésnath, 4,000—4,400 feet (10-iv-09). Only recorded hitherto from Barrackpore near Calcutta.

Family Apidae.

16. *Normia westwoodi*, Grib.

Two specimens from Parésnath, 4,000—4,400 feet (15-iv-09). Only known from Bengal. There are specimens in the Indian Museum from Calcutta.

17. *Anthophora zonata*, Linn.

Parésnath, 4,300—4,400 feet (15-iv-09). "Throughout India, Burma, Tenasserim and Ceylon, extending through the Malay regions to Australia" (Bingham).

18. *Xylocopa amethystina*, Fabr.

Parésnath, 4,000—4,400 feet (12-iv-09). Although this species occurs in Calcutta and other places in the plains of Bengal, it penetrates further into the Himalayas than any other of the genus. The Indian Museum possesses specimens from Gilgit and Srinagar (Kashmir) and from the hills of Chota Nagpur and Upper Tenasserim; it also occurs in Bombay, Malabar and Ceylon. In May, 1911, I saw a *Xylocopa* which probably belonged to this species in a Simla garden situated at an altitude of slightly over 7,000 feet.

19. *Apis dorsata*, Fabr.

Parésnath; common in April. One of the commonest Indian bees; northwards its range extends into Tibet, eastwards to China and the Malay Archipelago; southwards to Tenasserim and the Malay Peninsula.

Family Chrysididae.

20. *Stilbum cyanurum*, Först.

Parésnath (12-iv-09). A cosmopolitan species.

21. *Chrysis oculata*, Fabr.

Parésnath, 4,300—4,400 feet (15-iv-09). Widely distributed in the plains of India and in Assam.

DIPTERA.

I am indebted to Mr. E. Brunetti for the identification of most of the following Diptera. The Trypetinae, which were unusually well represented, are now being worked out by Prof. Bezzi, who has found no less than five new species in the Parésnath collection.

Family PSYCHODIDAE.

1. *Phlebotomus major*, Annandale.

Annandale, Rec. Ind. Mus., iv, pp. 46 and 320.

A single male was taken in a bungalow situated at an altitude of 4,500 feet on Parésnath (April). The species is otherwise only known from the Himalayas and the Nepal terai. It is common both in the Simla and the Darjiling districts, especially at the end of June and in July, at altitudes of from 4,500 to 9,000 feet.

Family TIPULIDAE.

2. *Geranomyia semistriata*,* Brunetti.

Brunetti, Rec. Ind. Mus., vi, p. 277 (1911).

Several specimens of this species were obtained in herbage round a well situated at an altitude of about 4,300 feet. Three other Indian species are represented in the collection of the Indian Museum and have been described, together with the one from Parésnath, by Mr. Brunetti. The genus is widely distributed both in the Oriental Region and elsewhere.

Family LEPTIDAE.

3. *Atherix intermedia*,* Brunetti.

Brunetti, Rec. Ind. Mus., iii, p. 211 (1909).

Numerous specimens of this species were seen on rocks at the edge of the stream Sita Nullah (alt. 2,000 feet) on April 4th. In India the Leptidae appear to be confined to mountainous regions, and *A. intermedia* is the only species I have seen in numbers. The genus *Atherix* occurs both in the Himalayas and in Ceylon, and is widely distributed both in the Oriental Region and in other parts of the world.

Family BOMBYLIDAE.

4. *Exoprosopa niveiventris*,* Brunetti.

Brunetti, ibid., p. 214.

Two females and a male, apparently of the same species, were taken near the base of the hill (alt. *ca.* 1,000 feet). *E. niveiventris* has not been taken elsewhere.

5. *Argyramoeba distigma* (Wied.).

Brunetti, ibid., p. 221.

Common all over the hill, hovering a short distance above the ground. This is one of the least scarce of the Indian Bombylidae, occurring chiefly in the plains. It has also been recorded from several of the islands of Malaysia.

ACALYPTERATA, subfamily SEPSINAE.

6. *Sepsis cynipsea* (Linn.).

A pair were taken on Parésnath in April at an altitude of 4,350 feet. This common Palaearctic species occurs all along the Himalayas and is also found in the hills of Assam, but does not occur in the plains except just at the base of the Himalayas.

Numerous other Diptera were taken but have not yet been identified.

COLEOPTERA.

Although a considerable collection of beetles was made on Parésnath, it has been only possible to get a few species identified as yet. The most striking form was *Thysia wallichii*, Hope, a large Longicorn rendered conspicuous by its barred elytra and tufted antennae. This species was common at an altitude of 4,400 feet on the hill and was often observed on the wing. It is equally abundant at about the same altitude in the E. Himalayas, and its range extends eastwards through Assam and Upper Burma into China. Other conspicuous forms were the Cetoniinae *Clintesia klugii* (Hope) and *C. hearsiana*, Westw., which were found together in very large numbers, devouring the flowers of certain shrubs that grew near the top of the hill. *C. klugii* appears to be restricted to western and central India, while *C. hearsiana* has not been recorded from any other definite locality but Parésnath.

RHYNCHOTA.

The commoner and more conspicuous species of the Heteroptera from our Parésnath collection have been identified by Mr. C. Paiva, while Mr. W. L. Distant has recently described a number of new species. Only the larger Homoptera have yet been named, with the exception of one or two common Jassidae, but a large number of species will, I hope, be dealt with in the appendix to Mr. Distant's account of the Rhynchota in the *Fauna of British India.* Of those that have been identified the most interesting from a geographical point of view are two species of Cicada, both diurnal in habit and each common on the occasion of one visit, *viz.*, *Haphsa nicomache* (Walk.), which was abundant in April, and a new species of *Terpnosia*,[1] which replaced it in May. The range of *H. nicomache*, so far as it is known, extends (apart from Parésnath) from Mussoorie in the W. Himalayas through Sikhim into Assam.

The Heteroptera of Parésnath appear to fall for the most part into one of two categories—either they are common and widely distributed species or else they have not yet been found except on the hill. This, however, is the case as regards most newly explored localities in India, and it would appear to be a fact that species of this suborder are as a rule either very widely distributed or else quite local in their distribution. The number

[1] *T. jenkinsi*, Dist., *Ann. Mag. Nat. Hist.*, 1912.

of hitherto undescribed forms found on Parésnath was considerable. It seems unnecessary to give a list of those that have been identified; several of the new species are described by Mr. Distant in *Ann. Soc. Ent. Belgique*, liii (1909), pp. 361, 362, etc.

LEPIDOPTERA.

We were not able to pay much attention to the Lepidoptera and only a few species were collected. Mr. Meyrick has recorded two species of Microlepidoptera from Parésnath, namely *Oligophlebia amalleuta** from an altitude of 4,000 feet and *Acrocercops convoluta*. The latter is also known from Kurseong in the E. Himalayas and is fairly common, as Mr. Meyrick informs me, at Maskeliya in Ceylon.

For the following note on the butterflies of Parésnath I am indebted to Capt. G. H. I. Graham, who has visited the hill on more than one occasion in order to collect Rhopalocera :—

List of butterflies caught on Parésnath Hill by Capt. G. H. I. Graham and a native catcher, during the months of April and October, 1908-09.

" NYMPHALIDAE.

Subfamily I.

Danais plexippus	Common.
,, chrysippus	,,
,, limniace	,,
Euploea core	,,
,, mulciber	A few seen on the wing.

Subfamily II.

Mycalesis perseus	Common.
,, mineus	,,
,, visala	,,
Orsotrioena meda	Uncommon.
Lethe europa	,,
,, nilgiriensis ..	Common from 2,000 feet to top of hill.
Ypthima baldus .	Uncommon.
,, inica	,,
Melanitis ismene .	Very common.

Subfamily IV.

Charaxes imna . .	♀ ♀ more common than ♂ ♂.
,, marmax	Seen but not caught.
,, fabius ..	Very scarce.
Eulepis athamas	Fairly common.

Euthalia lubentina	Very scarce.
,, garuda	Fairly common.
,, nais	Very ,,
Moduza procris	Scarce.
Athyma perius	Very common.
Neptis eurynome ..	,, ,,
,, columella	Scarce.
Junonia iphita	,,
,, lemonias	Common.
,, orithya	Very common.
,, atlites	Scarce.
,, hierta	Very common.
,, almana	,, ,,
Vanessa cardui	Very scarce.
Hypolimnas bolina	Very common.
,, misippus	♂ scarce, only 2 ♀ ♀ caught.
Kallima inachus	Above 2,000 feet; very common at about 3,000 feet at small stream over which there is a foot-bridge—the only spot on the whole hill I ever saw them. All the specimens taken were quite as large as those from Assam and of a much deeper blue.
Atella phalantha	Very common.
Argynnis hyperbius	Scarce.
Ergolis ariadne	Uncommon.

Subfamily V.

Telchinia violae	Very common.

NEMEOBIDAE.

Abisara echerius	Very common.

PAPILIONIDAE.

Papilio aristolochiae .	Common.
,, demoleus .	
,, polymnestor ..	Fairly common at bridge described above.
,, polytes	Common.
,, clytia .	Scarce.
,, dissimilis ..	,,
,, nomius .	Fairly common but difficult to capture; only seen in April.

PIERIDAE.

Leptosia xiphia	Fairly common.
Delias eucharis	Common.
Huphina nerissa	,,
Ixias pyrene	Very common.
Catopsillia crocale	Uncommon.
,, pyranthe	,,
,, florella	,,
Terias libythea	Scarce.
,, hecabe	Very common.

Some skippers and blues were taken, but I have not yet started on these families, so know little or nothing about them.

G. H. I. GRAHAM."

FISH.

A small collection of fish from a little stream (Sita Nullah) on the north face of Parésnath has been described by Dr. Jenkins in *Rec. Ind. Mus.*, v (1910), p. 128. Only five species were obtained, *viz.*, *Glyptosternum saisii*,* *Nemachilus savona*, *Discognathus lamta*, *Danio dangila*, *Ophiocephalus gachua*. Two of these species (*O. gachua* and *D. lamta*) have a wide distribution in India and even beyond its borders, while two (*D. dangila* and *N. savona*) are common in rocky streams throughout Western Bengal. *G. saisii* has only been found as yet on Parésnath. It belongs to a genus found in the mountains of both northern and southern India, and is allied to *G. pectinopterum*, a species common in the Himalayas from Kangra to Darjiling and also in the hills of the Punjab.

REPTILES and BATRACHIA.

The only frog obtained was *Rana limnochàris*, Wiegm., of which several small specimens were taken at the edge of a spring situated on the north face of the hill at an altitude of about 4,000 feet. This species is abundant all over the plains of India and ascends the Himalayas to an altitude of between 5,000 and 6,000 feet.

The following lizards were collected by Dr. Jenkins and myself or subsequently sent to the Indian Museum from Parésnath by Dr. Walter Saise :—

Hemidactylus brookii, Gray.

Hemidactylus gleadovii, *Boulenger, Fauna Brit. Ind.*—Rept., p. 86, fig. 27.

Hemidactylus brookii, *id.*, *Ann. Mag. Nat. Hist.* (vii), i, p. 123 (1898).

Several specimens were taken on the walls of a bungalow situated at 4,500 feet. This lizard is common all over the plains

of India both in houses and in open country, sheltering under stones in the latter situation. It rarely occurs, however, in the Himalayan hill stations.

Calotes versicolor (Daud.).

Common all over Parésnath. The specimens obtained were to some extent intermediate between the form *gigas* of Blyth, which is the common race all over S. India and Ceylon and also in Orissa, and the smaller form with less strongly marked sexual characters which is characteristic of the Himalayas, Lower Bengal and the countries to east of the Bay of Bengal. *C. versicolor* is common in both the East and the West Himalayas up to an altitude of at least 5,000 feet, but Dr. J R. Henderson tells me that he does not think that it ascends so high in the hills of the Madras Presidency, in which it is replaced at comparatively low altitudes by peculiar mountain species.

Charasia blanfordiana, Stoliczka.

The genus *Charasia* is peculiar to the Indian Peninsula, in which it takes the place of the Ethiopian and Palaearctic genus *Agama* found in the Himalayas as far east as the Little Nepal Valley. Three species of *Charasia* are known, namely, *Ch. ornata*, the range of which extends from Central India to the Ganges Valley in the United Provinces and to Kutch in Sind; *Ch. dorsalis*, which appears to be confined to the hills and tablelands of S. India; and *Ch. blanfordiana*, which is common in the hills of W Bengal (including the whole of Parésnath), at low altitudes among the hills of S. India and in Travancore along the base of the W Ghats. It also occurs among low hills in Central India, but I have been unable to find any record of its occurrence in the Bombay Presidency. In S. India it is apparently rare above about 2,500 feet, its place being taken at higher altitudes by *Ch. dorsalis*, which is common in the neighbourhood of Bangalore at an altitude of about 3,000 feet. Dr. J R. Henderson tells me that he has only seen *Ch. blanfordiana* from low hills in the Chingleput district south of Madras, and he thinks from similar hills in the Nellore and North Arcot districts.

Mabuia carinata (Schneid.).

This common lizard is abundant on the lower slopes of Parésnath. Several specimens from the base of the hill and its vicinity show a tendency for the frontal to split longitudinally.

Lygosoma sikkimense (Blyth.).

Mocoa sacra, *Stoliczka, Journ. As. Soc. Bengal*, xli, p. 128, pl. iv, fig. 4 (1872).

Lygosoma sikkimense, *Boulenger, Fauna Brit. Ind.*—Rept., pp. 199-200.

Stoliczka many years ago obtained a single specimen of this species (which he described as the type of a new species, *Mocoa sacra*) from one of the little shrines on the ridge of Parésnath. I was so fortunate as to obtain a second near the summit. Both specimens are in the collection of the Indian Museum and I have compared them very carefully with a large series from Sikhim, Darjiling and Nepal. I can find no constant difference. My specimen has the fourth toe shorter than is usually the case, but one of the supposed specific characters of *M. sacra* was that this toe was longer than in *L. sikkimense*, and in Stoliczka's specimen, although it is not actually longer than in many Himalayan individuals, it is much longer than in mine. There can be no doubt that Boulenger was right in relegating *M sacra* to the synonymy of *L. sikkimense.*

L. sikkimense is a species otherwise peculiar to the E. Himalayas. We have no evidence that its range extends west of the Nepal Valley, and in the Little Nepal Valley it actually occurs side by side with *L. himalayanum*, a closely allied species that takes its place in the W Himalayas. Moreover, there is no evidence that *L. sikkimense* descends the Himalayas to altitudes of less than 3,000 feet. It is a damp-loving species and, unlike most skinks, is oviparous, laying its eggs in wet moss on tree-trunks during the rains. The eggs have comparatively soft, leathery skins, which shrivel up if they become dry. In these circumstances the embryo perishes.

II.—SUMMARY AND CONCLUSIONS.

The data set forth above must be regarded as extremely imperfect, but, imperfect as they are, they afford evidence of one remarkable fact, namely, that whereas a large proportion of the fauna of Parésnath is identical with that of the Ganges valley and a smaller proportion apparently endemic on the hill, a Himalayan element can also be detected which is totally absent from the surrounding plains. Representatives of this element are *Phlebotomus major* and *Sepsis cynipsea* among the Diptera (both representing families that have been more thoroughly investigated than most in India), *Haphsa nicomache* among the Rhynchota, *Thysia wallichii* among the beetles, and above all *Lygosoma sikkimense* among the lizards. Although winged insects might be blown with comparative ease across the Ganges valley from the Nepal foot-hills to Parésnath, it is quite impossible that a lizard could be carried in this way. It is impossible, moreover, that the eggs of *L. sikkimense* could be transported in a living condition by birds, for they perish within a short period of being removed from the damp moss in which they are laid. We must therefore seek for a geographical explanation of the occurrence of this lizard on an isolated hill-top two hundred miles from its present abode.

It is of course no new discovery that the fauna of hill-tops south of the Ganges valley includes a Himalayan element, and a great deal has been written about this fact with reference to the mountains of the Madras Presidency. A summary of all the more important writings on the subject will be found in the late Dr. W. T. Blanford's classical memoir on the distribution of the Indian vertebrates in the *Phil. Trans. Roy. Soc.*, vol. 194 (B), 1901 (p. 422, etc.).

The generally accepted explanation of distributional phenomena of the kind is that it is due partly to the transport of winged animals or the eggs of non-winged organisms by aërial currents and perhaps occasionally by birds, and partly to changes in the distribution and extent of the glaciers of the higher mountain ranges. Much evidence has been adduced by geologists in support of the belief that the glaciers of the Himalayas, at a period not very remote, extended considerably further south than they do at present. La Touche,[1] however, has recently shown that they cannot have extended as far as the Ganges valley, except possibly at an ancient geological period. It can, I think, hardly be maintained that any of the species common to the Himalayas and Parésnath existed in their present form at this ancient period, and it seems unnecessary to go far back in geological time to search for an explanation of their present geographical distribution. There is no reason whatsoever to think that the individuals living on Parésnath were ever isolated by a ring of ice or driven to the summit by glaciers sufficiently extensive to submerge the base of the hill: but it must be remembered that the secular movements of glaciers are accompanied by profound modifications not only in temperature but also in humidity, and humidity is perhaps an even more important factor in the distribution of reptiles and insects than actual temperature. We must suppose that *Lygosoma sikkimense* once lived in the plains as well as or instead of in the hills, but that a fall in the atmospheric humidity of the former, perhaps due in part to movements of glaciers in the Himalayas, drove it up into the E. Himalayas on the one hand and the summit of Parésnath on the other, or confined it to comparatively high altitudes.

It is perhaps worth noting that the Himalayan element in the fauna of Parésnath appears to be allied to that of the E. Himalayas, whereas that in the flora rather shows affinities with the flora of Kumaon. The climate is, however, very similar to that of the lower slopes of the hills below Naini Tal and we may suppose that seeds brought by winds or birds from that part of the Himalayan ranges would have a better chance of germinating and propagating their species than those from the damper forests of Nepal or Sikhim, which are actually nearer in space. Hooker says of the flora of Parésnath, which

[1] *Geological Magazine* (v), vii, p. 193 (1910).

he visited in 1848: "Of plants eminently typical of a moister atmosphere, I may mention the genera *Bolbophyllum*, *Begonia*, *Aeginetia*, *Disporum*, *Roxburghia*, *Panax*, *Eugenia*, *Myrsine*, *Shorea*, *Millettia*, ferns, mosses and foliaceous lichens; which appeared in strange association with such dry-climate genera as *Kalanchoe*, *Pterospermum*, and the dwarf-palm, *Phoenix*. Add to this list the *Berberis asiatica*, *Clematis nutans*, *Thalictrum glyphocarpum*, 27 grasses, *Cardamine*, etc., and the mountain-top presents a mixture of the plants of a damp hot, a dry hot, and of a temperate climate, in fairly balanced proportions. The prime elements of a tropical flora were however wholly wanting on Paras-nath, where are neither peppers, *Pothos*, *Arum*, tall or climbing palms, tree-ferns, *Guttiferae*, vines, or laurels."—*Himalayan Journals*, vol. i, pp. 23-24, footnote.