

# NOTE ON SOME POSSIBLE PSILOPHYTE REMAINS FROM SPITI, NORTH-WEST HIMALAYAS\*

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The notes and photographs given here were left uncompleted by Professor Sahni. He believed that they were of great potential importance and had consulted many people about them during his tour of America and Europe. At the same time he appears to have doubted the plant nature of some of the specimens. He left the photographs given here, together with some others, and a general introduction to the paper in note form. This I have freely edited and take responsibility for any mistakes that may have been made.

He left no full description of the specimens, but merely pencil notes written around some of the figures. In describing the specimens, I have availed myself of these notes but again I must assume responsibility for any mistakes.

T. M. HARRIS, December 1949

THE object of this brief note is to describe some fragmentary fossils from the province of Spiti in the upper Suttlej basin of the north-west Himalayas. Some poorly preserved animals are associated with the plants.

These fossils were collected by H. H. Hayden and A. von Kraft as long ago as 1899. I am indebted to the Geological Survey of India for permission to describe them. The localities at which the specimens are reported to have been collected and the ages of the beds as recorded in the register of the Survey are given below.

A brief mention of these fossils and of their suspected Psilophyte affinities was made in 1938 (p. 56), though no description was given.

If these fossils are true Psilophyte remains, their main interest is geographic, since no such remains were known from this region. The possibility that their age is Silurian or Ordovician gives them further interest, and it is clear that if such an early age is established and if better material can be obtained proving their land plant nature without doubt, their importance would be great.

So far as I know the geographically nearest known occurrences of this widespread group of plants are in China, particularly those in Yunnan. In 1927 Halle described *Arthro-*

*stigma* from the Lower Devonian of Chanyi in eastern Yunnan, and in 1936 he recorded *Protolapidodendron*, *Protopteridium* and *Drepanophycus* (= *Arthrostigma*) from the district Chuching in the same province. H. C. Sze followed in 1941 with a description of fossils referred to *Psilophyton princeps* and ?*Hostimella* sp. from Chaotung in E. Yunnan. In 1946 J. Hsü described several species from Chinese localities which are nearer to Spiti than any previously recorded; the beds are regarded as Devonian. To the north the geographically nearest records are those in Russian Turkestan (KRYSHTOFOVITCH, 1927).

The age of the Spiti series was regarded by Hayden (1904) as Silurian. He published a section in which eight fossiliferous layers were described, the upper seven of which contain such marine animals as corals, brachiopods, Cystidia, trilobites; of the lowest one with the plants he states: "The only fossils found in the lowest bed (No. 1) were impressions of *Orthis* sp. ind., plant remains including *Bythotrephis* sp. cf. *gracilis* Hall and Crinoid stems."

*Bythotrephis* is the name given to some fairly large, branched 'fucoid' casts looking like non-calcareous seaweeds. There are no fine details (see COWPER REED, 1912). Cowper Reed's specimens of '*Bythotrephis*' are relevant to this note, but unfortunately are not at present available. A photograph of one of them (10/704) shows that the preservation is quite different — the fossil consisting of a solid mud-filled cast of lighter colour than the matrix. They have no trace of spinous branches and though they show forked branching, they are thicker than most of the present ones.

Cowper Reed (1912), however, regarded the age as Ordovician and gives the following list (p. 144):

*Orthis* (*Dinorthis*) *Thakil*  
*Orthis* (*Dalmanella*) *testudenaria*?  
*Orthis* sp.  
*Rafinesquina cratera*?

\* I am extremely grateful to Professor T. M. Harris, F.R.S., of the University of Reading, England, for having very kindly taken the great trouble of going through the notes and figures of Professor B. Sahni and for having edited this paper for publication. — MRS. SAVITRI SAHNI

*Lichas* sp.  
*Pasceolus mellifluus*  
*Bythotrephis* aff. *succulens*  
*Bythotrephis* aff. *gracilis*

I have pleasure in tendering my thanks to several colleagues who gave me laboratory facilities to examine the material during a tour in America and Europe: to Professor Chester A. Arnold of Michigan University for facilities given me at Ann Arbor (December 1947), to Professor T. G. Halle of the Riksmuseum, Stockholm (June and July 1948) where nearly all the photographs reproduced here were kindly made for me, and Professor Ludi of the Geobotanisches Institut Ruebel at Zürich (July and August 1948) where most of the macerations were attempted.

I have had the advantage of showing the material to several palaeobotanists who are conversant with Psilophyte remains: at Ann Arbor Professor Arnold, at Oslo Professor O. A. Höeg, and at Stockholm Professor Halle and also Professor Suzanne Leclercq of Liège and Dr. Isabel C. Cookson of Melbourne who happened to be there. As a result the idea that the plant fragments might be of Psilophyte nature was to some extent strengthened. Professor Halle noticed spine-like appendages on one of the axes, while on other axis, which already showed a few spines, Professor Leclercq was able to show up a whole series of spines.

#### DESCRIPTION OF THE SPECIMEN

The collection consists of eight small pieces of shale with very fragmentary fossils. They are numbered K6/600.

The chief fossils on all are straight axes and forked axes. Both have every appearance of having been broken. The longest is just under 3 cm. It is very probable that the two types may have been continuous. Some of both the straight and the forked axes have a rough surface (Figs. 8, 13) which might represent minute spines. Others however (Figs. 11, 15) look quite smooth; most are intermediate. All the

forked axes show a wide angle of divergence of the branches, and none shows any structure between the fork.

The photographs which were taken under xylol suggest that the substance is carbonaceous; it is, however, a deep rusty brown.

Macerations of the fossil material were attempted without success. No transfer preparations were made because it seemed virtually certain, in view of the apparent lack of organic substance, that they would yield no details of value.

Most of the specimens show no trace of a central core or stele, but in some there is a darker part in the middle which could be of this nature. No tracheids were visible, and indeed the fine preservation is so poor that no details were visible beyond those figured.

If, as seems reasonable enough, the forked fragments were the continuations of the straight unbranched fragments, the fossil, whatever its nature, would have had a somewhat *Hostimella*-like aspect in its smooth form, or *Psilophyton*-like in its spiny form. The spiny form, however, has a perceptible resemblance to various marine hydroids, and this nature is by no means ruled out by the suggestions of a vascular core, because the core is not sufficiently continuous to be fully convincing. Thus the possible animal (e.g. graptolite) nature of these fossils is not entirely excluded.

*Associated Specimens* — 1. A single small fragment of a reticulate fossil (FIG. 17). It looks like the dendroid graptolite *Dictyonema* but no confirmatory detail could be made out. No early plant of this form seems to be known.

2. A minute fragment (FIG. 9) of honeycomb appearance. This does not recall any early plant or animal known to me.

Another rather similar specimen from Spiti (K9/730) is shown in Fig. 3. It agrees with *Pasceolus mellifluus* (Salter) described in Cowper Reed (1912, p. 118). *Pasceolus* is unclassified, and it is not clear whether its horizon is the same as that of K6/600.

#### REFERENCES

HAYDEN, H. H. (1904). The geology of Spiti, with parts of Bashahr and Rupshu. *Mem. Geol. Surv. India* 36 (1): 1-127.

HALLE, T. G. (1927). Fossil plants from southwestern China. *Palaeontologia Sinica*. Ser. A. 1. Fasc. 2: 1-26.

- Idem (1936). On *Drepanophycus*, *Protolepidodendron* and *Protopteridium* with notes on the Palaeozoic flora of Yunnan. *Ibid.* Ser. A. **1**. Fasc. 4: 1-28.
- Hsü, J. (1946). Plant fragments from Devonian beds in central Yunnan, China. *Journ. Ind. Bot. Soc.* Iyengar Comm. Vol.: 339-360.
- KRYSHTOFOVITCH, A. (1927). Some traces of the old Devonian flora in Ural, Turkestan and Siberia. *Bull. Com. Geol.* **46**: 329-335.
- REED, F. R. C. (1912). Ordovician and Silurian fossils from the central Himalayas. *Mem. Geol. Surv. India Pal. Indica* Ser. 15. 7(2).
- SAHNI, B. (1938). Recent advances in Indian palaeobotany. *Lucknow University Studies*. No. 2: 1-98.
- SZE, H. C. (1941). A new occurrence of the oldest land plants from the Chaotung district, Yunnan. *Bull. Geol. Soc. China.* **21**(1): 107-110.

## EXPLANATION OF PLATE I

*Fig. 3 represents K9/730; all the rest are K6/600.*

- 1, 2. Hand specimens showing forked and un-forked axes. Natural size.
3. Specimen K9/730 showing a hexagonal pattern. Possibly an animal?  $\times 4\frac{1}{2}$ .
4. Slender straight axis forking at its apex. It appears to be slightly spiny.  $\times 4$ .
5. Forked axis broken just below the fork.  $\times 4$ .
6. Broad forked axis, apparently quite smooth.  $\times 4$ .
7. Forked axis with a suggestion of a central strand in the upper part.  $\times 4$ .
8. Forked axis, apparently covered with small spines.  $\times 4$ .
9. Specimen showing a hexagonal pattern (present at the edge of FIG. 2 though scarcely visible). Compare with Fig. 3.
10. Forked axis with one side broken at the base.  $\times 4$ .
11. Smooth forked axis.
12. Unusually slender forked axis.  $\times 4$ .
13. Unbranched axis (seen in the middle of FIG. 2) showing spine-like outgrowths, chiefly on one side.  $\times 8$ .
14. Forked axis.  $\times 4$ .
15. Forked axis in which the main stem is no larger than the branches.  $\times 4$ .
16. Unbranched axis, bearing small spines on both sides.  $\times 4$ .
17. Reticulate fossil. Compare the graptolite *Dictyonema*.  $\times 4$ .

