The Palaeobotanist, 32(1): 76-81, 1984.

AN ADDITION TO KNOWLEDGE OF *OTOZAMITES PECTEN* SAHNI & SITHOLEY

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ABSTRACT

An account of *Otozamites pecten* Sahni & Sitholey is based on richer material which permits fuller description of its form while its cuticle is figured for the first time.

Key-words — *Otozamites*, Megafossil, Jurassic (Salt Range).

सारांश

ऑटोज़ॅमाइटिस पैक्टन साहनी व सिथोले के अभिज्ञान में और योगदान – राजेन्द्र वर्मा सिथोले (संपादक – पंकज कुमार पाल एवं टॉमस मैक्सवैल हेरिस)

ऑटोज़ॅमाइटिस पैक्टन साहनी व सिथोले का यह प्रस्तुत वर्णन और अच्छे उपलब्ध प्रादर्शों पर आधारित है। इन्हीं प्रादर्शों के कारण इस प्रारूप का विस्तृत वर्णन संभव हुआ है तथा उपचर्म का भी सर्वप्रथम चित्रांकन किया गया है।

Note by editors — Dr M. N. Bose as Director of the Sahni Institute asked us to do what we could to prepare notes left by Dr Sitholey for publication. Dr Sitholey was working in the Botany Department of Lucknow University in the years around 1943 on a collection of Jurassic plants from the Salt Range, then part of undivided India, but now in Pakistan. With Professor Birbal Sahni, accounts of two species of *Phlebopteris* were published (Sahni & Sitholey, 1945) and earlier (Sahni & Sitholey, 1943) a brief note describing *Otozamites pecten*. In 1948 both Prof. Sahni and Dr Sitholey moved to the Palaeobotany Institute and as far as we know no more work was done on the Salt Range flora. Dr Sitholey left the Institute and Palaeobotany in 1954 and died in December, 1979.

We found several manuscript drafts on *Otozamites pecten* together with many photographs and drawings. Some hand specimens corresponding to these photographs are missing but we could recognize his figured cuticle slides, a few specimens and the transfers. What we did was to compile Dr Sitholey's positive statements from his notes and select and rearrange his figures so he is to be considered as sole author of this paper. We have added comparisons with later described species. But notes on other species are less satisfactory and we feel it would be unfair to Dr Sitholey's memory to offer them. They are unfinished work, and for those other species not even duplicates are available.

INTRODUCTION

OTOZAMITES PECTEN was described briefly in 1943 by Sahni and Sitholey who gave photographs of two small leaf fragments. As mentioned earlier the material was collected by Gee and Iyengar of G.S.I. from two points near Sakesar (Sheet 38P/14): (i) at about 2.5 km NE of Sakesar on a river tributary 550 m East of Point 3920, (ii) at Nala, also NE of Sakesar. The horizon is near the top of the Jurassic as represented near Sakesar.

DESCRIPTION

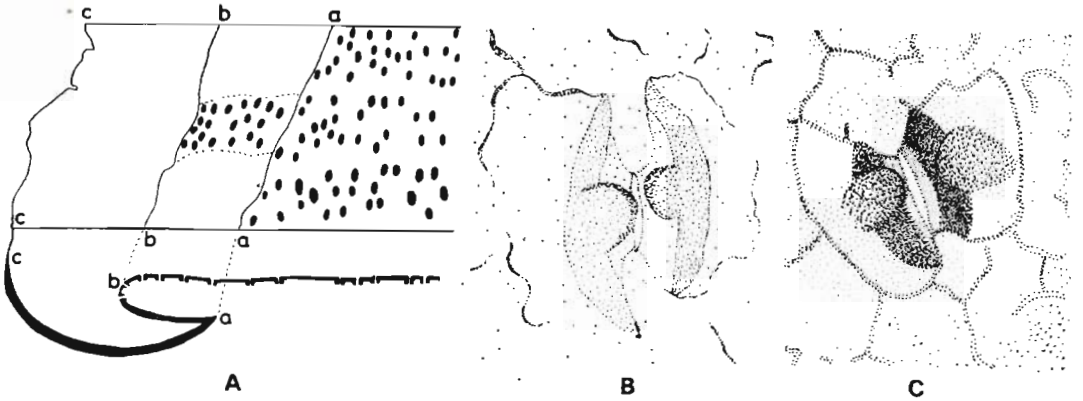
Genus — *Otozamites* Braun

Otozamites pecten Sahni & Sitholey

Pl. 1, figs 1-9; Pl. 2, figs 10-16; Text-fig. 1A-C

1943 *Otozamites pecten* Sahni & Sitholey, p. 178, pl. 8, figs 37, 38 (brief description, two leaf fragments figured).

1963 *Otozamites pecten* Sahni & Sitholey: Sitholey *Bull. natn. bot. Gdn*, 86 pl. 6, figs 37, 38 (another figured leaf).



TEXT-FIG. 1 — **A-C**, *Otozamites pecten* Sahni & Sitholey: **A**, marginal region of lower cuticle shown above an imaginary section of its original form including stomata, a-a-a representing the sharp inner edge of the recurved margin, b-b-b is the point where the lower cuticle bends downwards to form the inner edge of the marginal fold, c-c-c is where the upper cuticle was torn in preparation. Only one stomatal band is represented under the margin, the stomata appear crowded near the line b-b, some of the stomata represented were seen only vaguely, B.S.I.P. slide no. K35/157-1, × 40; **B**, typical stoma, cell outlines indistinct, B.S.I.P. slide no. K35/100-1, × 500; **C**, stomata from a leaf giving an unusually thick cuticle, B.S.I.P. slide no. K35/317, × 500.

1976 *Otozamites pecten* Sahni & Sitholey: Ramanujam *Asp. plant Sci., 1* fig. 37 (sketch of Sitholey's, 1963 fig. 38).

Emended Diagnosis — Leaf 12-18 mm wide in middle region (length unknown but estimated at 24-36 cm). Leaf narrowing very gradually towards apex. Base (not available in present material), but possibly with slightly longer pinnae and a thick rachis. Pinnae alternate, normally horizontal. Pinnae in most leaves nearly round, occasionally (? near base) slightly elongated, touching or overlapping pinna in front, pinna width 5-6 mm, widest 10 mm, anterior basal margin not or scarcely auriculate but sometimes overlapping posterior basal margin of next pinna on opposite side; apex of pinna rounded (never pointed). Upper surface of lamina slightly convex, substance of lamina very thick. margin recurved and in compressed condition forming a border 0.5 mm wide round lower surface but narrower near rachis. Veins often conspicuous on both surfaces, spreading from a point near the middle of the pinna base. In some leaves upper surface smooth, in other veins sunken.

Upper cuticle thick, often about 7 μm but lower much thinner. Over pinna surface cells flat, more or less square but outlines strongly sinuous, well marked in some leaves but not in others. Stomata absent, trichomes absent in most leaves but in some cells may bear a sac-like trichome or hole where it has been lost. Cells along veins not distinguished.

Lower cuticle forming three regions, stomatal strips, vein strips and margin. Stomatal strips about three times wider than vein strips, stomata may form 3-4 files but often files short and some stomata not in a file, nearly all transverse, rather evenly spaced, stomatal region overlapped

Additional notes by Editors — The material studied originally consisted of a dozen large and several small fragments but the larger ones have been lost. In every specimen the rock has split exposing the upper surface of the lamina. All leaves were flat except one which had its pinnae bent downwards. In the compressed fossils the pinna margin is sharp but we imagine it was rounded in life. As the lamina exceptionally thick, microtome sections were cut. These clearly differentiated the upper part of the mesophyll, the original palisade, which formed solid blocks from the more tenuous spongy mesophyll and showed the margin well. In one cuticle preparation the subsidiary cells are unusual in having a thickened surface (Text-fig. 1c).

Sahni and Sitholey (1943) mentioned two specimens nos. K35/107 and K35/549 as syntypes, out of these specimen no. K 35/549 is available as a transfer in the Birbal Sahni Institute of Palaeobotany and selected as the lectotype of the taxon.

at margins (and stomata then obscure). At end of stomatal surface cuticle bent upward and stomata seeming congested. In stomatal bands epidermal cells sinuous but outlines usually inconspicuous, in some leaves cells bulging in others forming papillae with lateral ends thickened and forming crescents and further obscuring epidermal cells. Stomata only slightly sunken, subsidiary cells small, outer wall often obscure, each subsidiary cell bearing a papilla pointing over stomatal aperture. On vein strips cells tending to be more elongated. Trichome bases or large papillae frequent, consisting of one, two or three cells with a thick bulging surface, occasional cells of this type present in stomatal bands. In marginal region part with stomata probably normal (but details obscure) then after bending upward abruptly lacking stomata. This part in some leaves showing cells with a flat surface and cells elongated parallel with margin but in other leaves surface of most cells bulging.

Rachis cuticle very thickly cutinised on lower side, thinner above. Lower side showing transverse ridges crossing many epidermal cells, these possibly represent ramentum bases. In original unmacerated state showing tubercles (possibly ramentum bases).

Lectotype — No. K35/549 of the Birbal Sahni Institute of Palaeobotany, Lucknow.

Locality — River tributary, 2.5 km northeast of Sakesar.

Age — Jurassic.

Comparison — Several species of *Otozamites* have small rounded pinnae. *O. bunburyanus* Zigno, 1868 (Italy) often has its pinnae obtusely pointed apically. *O. attenuatus* (England) once identified with *O. bunburyanus* (see Harris, 1964) has no reflexed margin. *O. marginatus* Saporta, 1875 has a reflexed margin but we know no microscopic details. However, an English specimen (Harris, 1964) has less clearly marked veins, more evenly distributed stomata and lacks the characteristic papillae of *O. pecten*. *O. vemavaramensis* Bose, 1966 and Bose and Jain, 1974 (India) has very small deltoid pinnae. Its margin is recurved. *O. bunburyanus* var. *indica* Seward & Sahni, 1920 belongs to *O. vemavaramensis* according to Bose (1966). *O. walkamotaensis* Bose & Zeba-Bano, 1981 (India) sometimes has nearly round pinnae (though they are usually longer). The margin has no stomata but is flat.

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EXPLANATION OF PLATES

PLATE 1

Otozamites pecten Sahni & Sitholey

1. Lectotype showing abaxial surface of leaf in transfer, B.S.I.P. slide no. K35/549-1. × 1.
2. Fragment near apex of leaf, specimen missing. × 1.
3. Another fragment near apex of leaf, B.S.I.P. slide no. K35/253. × 1,
4. Abaxial surface of leaf in transfer, B.S.I.P. slide no. K35/200-1. × 1.
5. Specimen with a thick rachis and slightly elongated pinnae, specimen missing. × 1.
6. Adaxial view of leaf, specimen missing. × 1.
7. Lectotype (see fig. 1). × 3.
8. Same specimen as fig. 3. × 4.
9. Magnified view of the adaxial surface of leaf, part of specimen shown in fig. 6. × 4.

PLATE 2

Otozamites pecten Sahni & Sitholey

10. Lower surface of pinna-cuticle, showing veins and stomatal strips, B.S.I.P. slide no. K35/157-1. × 9.
11. Pinna margin showing the bulging epidermal cells, B.S.I.P. slide no. K35/157-1.× 38.
12. Upper cuticle of Pinna, B.S.I.P. slide no. K35/100-1.× 240.
13. Upper cuticle of pinna showing perforations (?trichome bases), B.S.I.P. slide no. K35/484-1. × 240.
14. Lower cuticle of pinna showing distribution of stomata vein strips rather obscure in this specimen, B.S.I.P. slide no. K35/157-1.× 38.
15. Lower cuticle of pinna showing a few stomata, clear subsidiary cell papillae are seen on the top left stoma. Papillae scarcely developed on ordinary epidermal cells, B.S.I.P. slide no. K35/484-1.× 240.
16. Lower cuticle of pinna with strongly developed papillae on ordinary cells, B.S.I.P. slide no. K35/157-1.× 240.

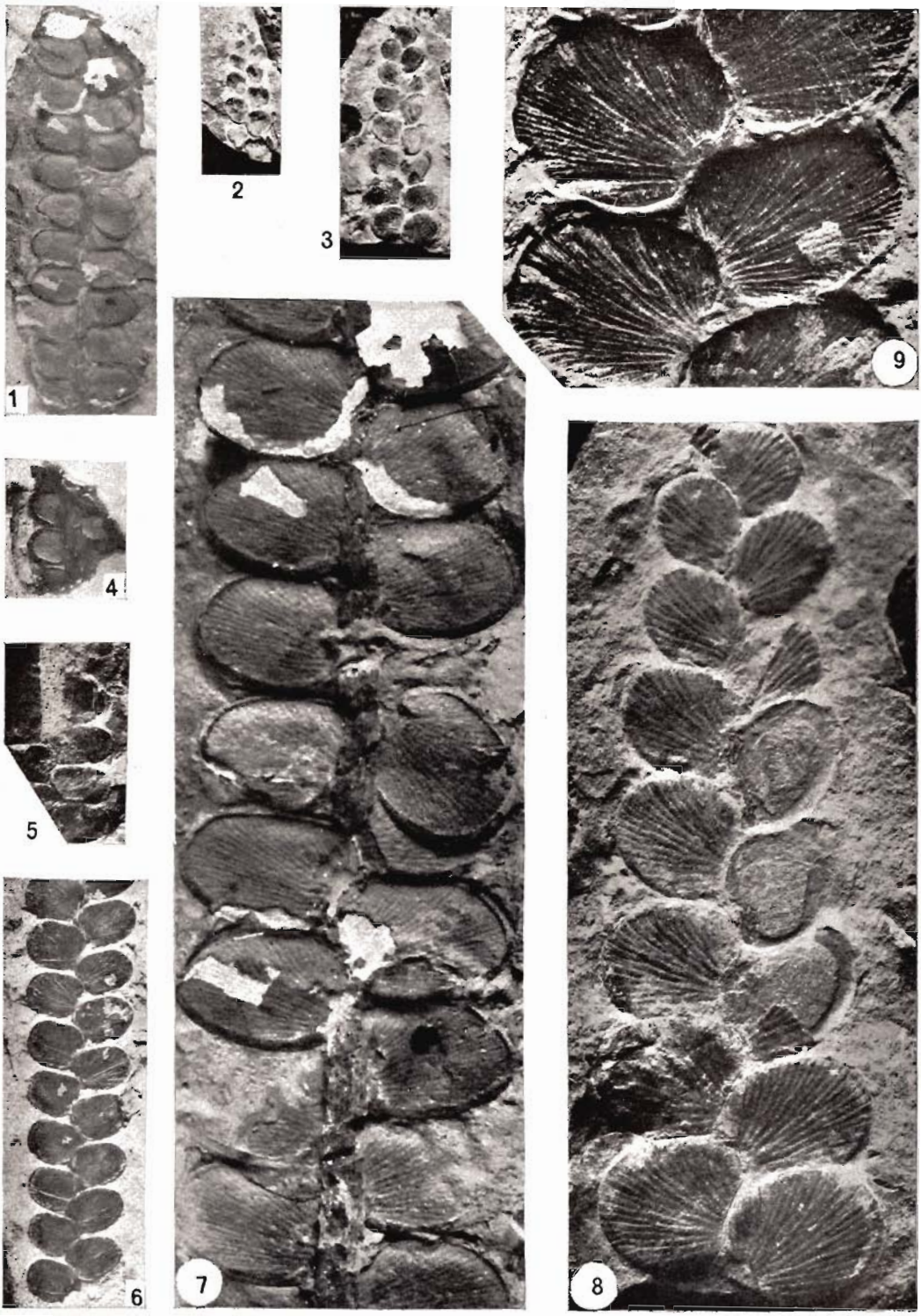
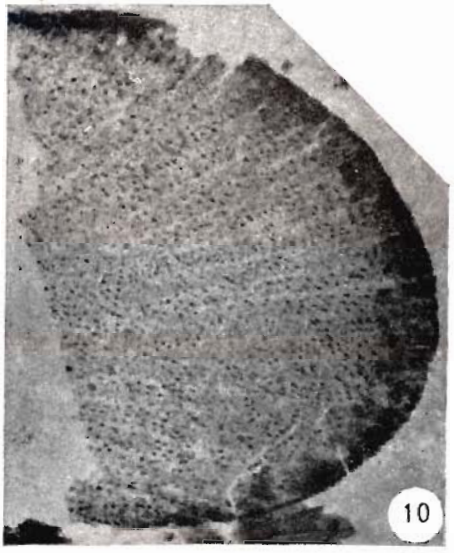
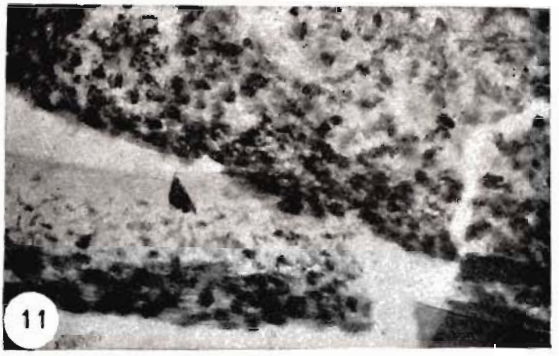
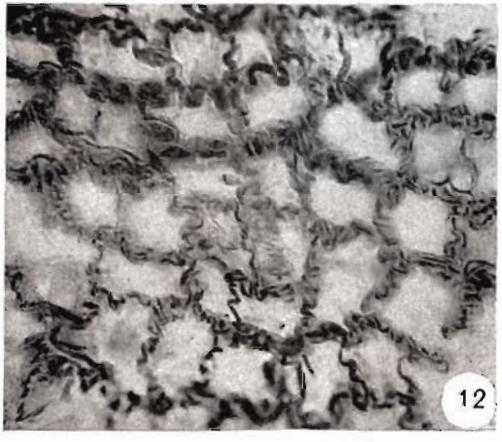


PLATE 1







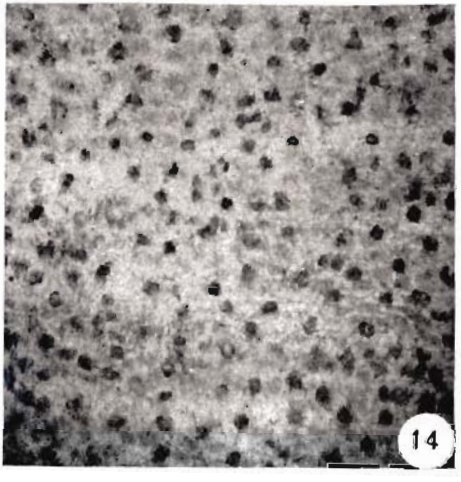


PLATE 2