OBSERVATIONS ON THE GENUS *ARCHILEJEUNEA* (SPRUCE) SCHIFFN*

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Abstract

Some interesting observations in a population of *Archilejeunea* from Kerala have been described. The plants are unique with dentitions on leaves, underleaves, female bracts and bracteole which indicate its affinity with the genus *Spruceanthus*. However, *Archilejeunea* differs in having segmented oil-bodies as opposed to homogeneous oil-bodies in *Spruceanthus*. All these characters are significant and warrant the status of a new variety of *Archilejeunea*, *A. apiculifolia* var. *dentifolia* var. nov.

Introduction

Archilejeunea (Spruce) Schiffn. belongs to Lejeuneaceae which is a large and probably the most complex family of the leafy liverworts as far as the correct delimitation of genera is concerned. So far over 100 genera (70 accepted even by 'lumpers') and more than 1,500 species have been created since 1820 when the first genus of the family was described. The increase in number of genera may be attributed to a great degree of morphological and anatomical diversity displayed by these plants growing under varied ecological conditions (see Gradstein, 1979). This has also puzzled several workers in deciding the status of various species as well.

Recently Udar and Awasthi (1981, 1981 a, 1982) provided details of the Indian taxa of *Archilejeunea* with critical discussion regarding their status. Three species have been described from India : *A. minutilobula* Udar & Awasthi, *A. apiculifolia* St., and *A. mariana* (Gott). St. Verdoorn (1934) reduced *A. apiculifolia* to synonym of *A. mariana*. Amakawa (1964) pointed out that *A. mariana* (Gott.) St. is closely related to *Spruceanthus*. The four keeled perianth, which is one of the characteristics of the *Archilejeunea* may often have 1-2 subordinate keels on its dorsal and /or ventral surface. According to him "These conditions are also often observed in the perianth of *Spruceanthus polymorphus*. Moreover, the bract of *A. mariana* becomes obtuse to acute at apex and is inconspicuously and distantly denticulate along the margin, also the bracteole is inconspicuously sinuate-angulate along the margin, although these are not finely serrate as those of *Spruceanthus*". Mizutani (1966) later treated the same as *Spruceanthus marianus* (Gott.) Mizut. (see also Mizutani, 1978; Gradstein & Inoue, 1980).

Recently Udar and Awasthi (1981a, 1982) on the basis of segmented oil-bodies and presence of subfloral innovation mostly in one side of the female inflorescence, designated plants having mostly apiculate leaf apices as *A. apiculifolia* and plants having rounded leaf apices as *A. mariana*.

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In a recent collection of liverworts a population of plants similar to *A. apiculifolia* was discovered but their leaves, underleaves, female bracts and bracteole possessed small denitions as has also been acknowledged by Gradstein and Buskes (1985) in *A mariana.*

Critical evaluation of the specimens warrant its status as a new variety of *A. apiculifolia* var. *dentifolia* var nov. as it shares the features of *Archilejeunea* and *Spruceanthus* both.

Description

Archilejeunea apiculifolia var *dentifolia* var. nov.
Text-fig. 1 : 1-23; Text-fig. 2 : 1-11

Haec var. a alius in folis, amphigastrie, bractae feminae et bracteolae e dentato marginatae differt.

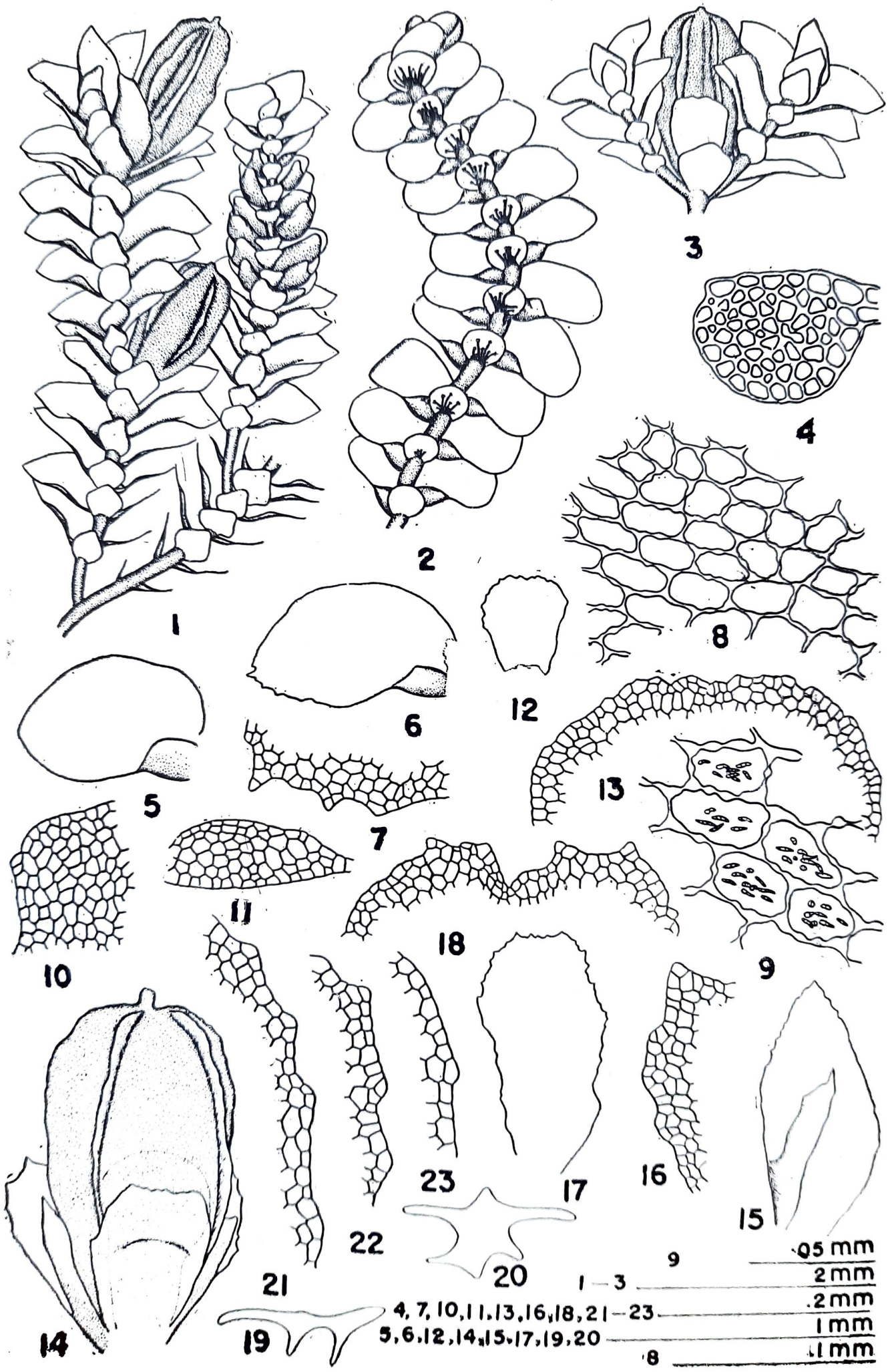
Monoecious. Plants 10-20 mm long, branched irregularly by *Lejeunea*-type of branching. Stem in cross-section with 18-19 (-20) cortical and several medullary cells, medullary cells comparatively smaller with distinct trigones. Leaves closely arranged, widely spreading, 0.80-0.94 mm long, 0.48-0.54 mm wide, ovate or oblong, with entire or dentate margin towards apex, postical margin incurved, apex usually acute, sometimes obtuse or rounded, cells with distinct radiate trigones and intermediate nodular thickenings, basal cells 28-48×20-24 μm, median cells 20-40×16-20 μm, marginal cells 8-12×8-12 μm; lobule small, 1/4 of the lobe length, 0.16-0.19 mm long, 0.11—0.14 mm wide, with inconspicuous tooth or rarely with 3-4 cells long ciliate tooth; oil-bodies segmented, 6-10 in each median cell of the leaf, ovate-elliptical (4-6 ×2-3 μm) or even rounded (3-4 μm in diameter). Underleaves 0.35—0.40 mm long, 0.35—0.38 mm wide, distantly arranged, raised at an angle of 45°—60°, obcuneate, longer than wide or as long as wide, or even wider than long, with rotundate apex, margin irregularly toothed, variously curved towards apex, constricted at base and often raised along the median line. Male inflorescence intercalary or terminal, preceeded by vegetative leaves, bracts in 5-12 pairs, hypostatic, almost equally bilobed, lobe ovate 0.5—0.7 (0.8) mm long, 0.34—0.42 mm wide, apex obtuse, occasionally acute, margin entire, lobule 0.3—0.4 mm long, 0.18—0.25 mm wide, with apex obtuse or sometimes acute; bracteole present throughout the length of the spike (inflorescence), 0.22—0.35 mm long, 0.25—0.40 mm wide, margin entire or wavy. Female inflorescence terminal on an elongated branch or on main axis with mostly single subfloral innovation of the *Radula*-type, bracts slightly larger than leaves, 0.89—0.96 mm long, 0.35—0.43 mm wide, oblong, margin dentate towards apex, apex acute, lobuel 0.64—0.72 mm long, 0.35—0.43 mm wide, oblong, adnate with the lobe for usually 1/3 or 1/2 of its length, extended for 1/3 or 1/2 of its length beyond the keel, denticulate at margin, acute towards apex; bracteole, 0.86—1.08 mm long, 0.43—0.51 mm wide, larger than the underleaves, obovate, apical margin irregularly toothed, apex truncate or sometimes retuse or even bifid, perianth 1.28—1.60 mm long, 0.67—0.73 mm wide, obovate with 4-5 plicae, plicae wavy or sometimes with few dentitions. Mature sporphyte not seen. Propagule formation on leaf surface and *in situ* spore germination present.

The Type specimens have been deposited in Lucknow University Hepatic Herbarium.

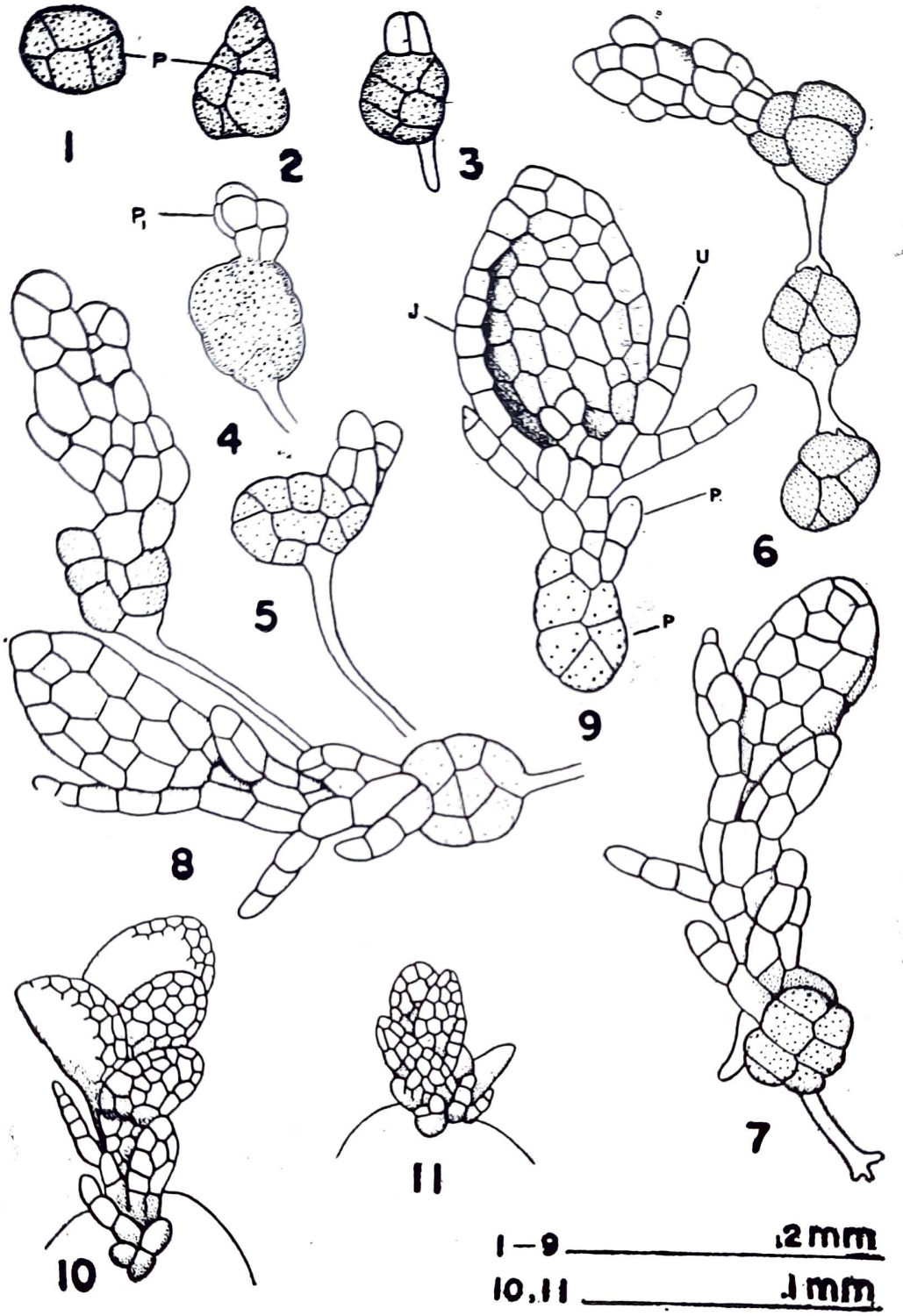
Holotype—LWU 5641/82, Loc. : Achilatti forest, Kerala, Leg. : R. Udar and party, Dt. : 22.9.1982.

Habitat—On the bark of a angiosperm tree in association of moss and *Lejeunea* sp.

Other specimens xamined—Holotype G 14994, *Archilejeunea apiculifolia*, Leg. : Pfleiderer,



Text-figure 1



Text-figure 2—*Archilejeunea apiculifolia* var. *dentifolia* var. nov. **1-9**, various stages of *in situ* spore germination; **10**, **11**, Plant-lets on leaf surface. (P—protonema, P_1—primary leaf, J—juvenile leaf, U-underleaf).

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Text-figure 1—*Archilejeunea apiculifolia* var. *dentifolia* var. nov. **1**, portion of the plant (suberect branch) with male and female inflorescenes; **2**, portion of the plant (branch closely appressed to the substratum); **3**, female inflorescence with two subfloral innovation; **4**, cross-section of the stem; **5**, leaf with entire margin; **6**, leaf with dentate margin; **7**, margin of the leaf showing dentitions; **8**, basal cells of the leaf; **9**, median cells of the leaf with oil-bodies; **10**, **11**, leaf lobules; **12**, underleaf; **13**, margin of the underleaf showing dentitions, **14**, female inflorescence; **15**, female bract; **16**, margin of the female bract showing dentitions; **17**, female bracteole; **18**, margin of female bracteole showing dentitions; **19**, **20**, cross-sections of the perianth; **21**, plica of the perianth of *A. apiculifolia* var. *dentifolia* showing dentitions; **22**, plica of the perianth of *A. mariana* showing dentitions; **23**, plica of the perianth of *A. apiculifolia* showing dentitions.

Loc. : Kudremukh, India, Dt. : April 1911, Loc. : Samoa, dt. : 6, 1903, Det. : F. Verdoorn, NICH 242641, Leg. : H. O. Whitties and H. A. Miller, Det. : Muller & Bonner. BM?, *Archilejeunea mariana* leg. : E. Nyman, Loc. L Kaiser Wilhelms-land : Friedrich-Wilhelm-Hafer, dt. : 1899; BM 1457, Leg. : G. H. S. Woood, Loc. : N. Borneo 20.5.1954. det. : Van der Wijte. BM? Leg : Max Fleischer, Loc. : Samoa, Dt. : 6, 1903, Det. : Fr. Verdoorn.

Discussion

The plants of *Archilejeunea apiculifolia* var. *dentifolia* grow on the bark with some of its branches closely appressed to the substratum, while others remain suberect. The leaves (Text-fig. 1 : 2) of the former (appressed branches) have rounded apex, entire margin of the lobe and relatively larger lobule (0.18—0.19×0.13—0.14 mm), and under leaves also with entitre margin but producing rhizoids (Text-fig. 1:2), while the leaves (Text fig. 1:1) of the latter (suberect branches) have acute or apiculate apices and denticulate margin with comparatively smaller leaf-lobule (0.16-0.18×0.13 mm) and underleaves with dentate margin but lacking rhizoids (Text-fig. 1:1). The female inflorescence terminating the main axis or the branch, usually give rise to single subfloral innovation which after producing 2-6 pairs of leaves often again produces a subfloral innovation. The latter may in turn again terminate into a female inflorescence (Text-fig. 1 : 1) Such regular formation of female inflorescence in a sequence up to a maximum of four mostly on one side has been observed in several specimens, rather characteristic of Indian species of *Archilejeunea* (Udar & Awasthi, 1981, 1981a, 1982). The plicae of the perianth, although normally smooth are sometimes sparsely denticulate or crenulate as also in *A. apiculifolia* (Text-fig. 1 : 20) and *A. mariana* (Text-fig. 1 : 21). In *A. minutilobula*, the perianth keels are however, almost invariably denticulate (Udar & Awasthi, 1981). In *Spruceanthus* with which it shows a close affinity, the dentitions on plicae are altogether absent (see Udar & Awasthi, 1982a).

The mature sporophyte is extremely rare in this taxon. In one specimen, however, a deteriorated sporophyte, on investigation revealed interesting stages of *in situ* germination of spore which is being described for the first time for any Indian taxa of the genus *Archilejeunea*. The other features of the sporophyte could not be clearly seen. Some stages resembling *Lopholejeunea*-type of spore germination have been observed in this taxon as has also been earlier reported for *A. auberiana* by Fulford, 1956, see also Nehira, 1983) A few celled globose protonema is first formed with the exospore (fig. 2:1;2 : p). The leafy shoot from such a sporeling initially bears ovate primary leaf (Text-fig. 2; 4 : p_1), saccate inflated juvenile leaf (Text-fig. 2 : 9J) and narrow ovate underleaf (Text-fig. 2 : 9: U).

Besides, few older leaves in some of the plants frequently produce 'regenerants' or plant-lets (Text-fig. 2:10; 11). This evidently shows that these plants have an alternative method of asexual reproduction which is rather uncommon in the taxa of Ptychanthoideae. Only few species of *Acrolejeunea* (Spruce) Schiffn. (Gradstein, 1975), *Caudalejeunea* St., (Gradstein, 1974) and *Schiffneriolejeunea* Verd. (Udar & Awasthi, 1984) are known to reproduce asexually.

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