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NOTE

The rediscovery of *Youngia atripappa* (Babc.) N. Kilian in India after a century; its circumscription and nomenclature and the lectotypification of *Crepis atripappa* Babc.

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ABSTRACT: Nomenclature and typification of *Crepis gracilis* Hook. f. & Thomson ex C.B. Clarke, *C. atripappa* Babc.,*Youngia gracilis* Hook. f. ex Babc. & Stebbins *Youngia stebbinsiana* S.Y. Hu and *Y. atripappa* (Babc.) N. Kilian are discussed. *Y. atripappa* (Babc.) N. Kilian is considered as correct name for the species following Kilian's observation. The status of remaining names is also ascertained. Typification of *Crepis atripappa* Babc. is analyzed and the name is lectotypified following provisions of the present Code. Information on the rediscovery of the species after 105 years from India as well as of its type locality is provided. Population estimation was carried out in three successive years, from 2013 to 2015. Detailed description, illustrations, field photographs with related data are also provided for proper circumscription and to facilitate its correct as well as easy identification.

KEY WORDS: *Crepis atripappa*, India, Lectotypification, Rediscovery, Sikkim Himalaya, Type locality, *Youngia atripappa*.

INTRODUCTION

Crepis gracilis Hook. f. & Thomson ex C.B. Clarke was described from North Sikkim by C.B. Clarke (1876). However, that *C. gracilis* is a later homonym due to preoccupation of the specific epithet '*gracilis*' by another species, *Crepis gracilis* Lej. (in Rev. Fl. Spa: 249. 1825). In this context two other names, viz. *Youngia gracilis* Hook. f. ex Babc. & Stebbins, *Y. stebbinsiana* S.Y. Hu applied to the taxon are illegitimate and superfluous (Kilian in Zhu and Kilian, 2011). In this situation, the name *Crepis atripappa* Babc. published by Babcock (1928) and subsequently cited as synonym of *Youngia gracilis* Hook.f. ex Babc. & Stebbins by Babcock and Stebbins (1937) is a legitimate name but as Babcock clearly stated "sp. nov." it should not be considered replacement name. Thus the new combination for the species, *Youngia atripappa* (Babc.) N. Kilian by Kilian (in Zhu and Kilian, 2011), is the correct name for the taxon.

A perusal of the Indian literature (Rao, *et al.*,1988; Mamgain and Rao, 1995; Maity, 2005) and critical examination of herbaria, like CAL, BSHC, CUH, etc. reveals that the species has never been collected or recorded after 1909 from the country, although the region of North Sikkim is one of the most explored areas of the state. Apart from the type collections, only five specimens are available at CAL and all of them were collected between 1892 to 1909 and remained as the representation in Indian herbaria.

Recently as part of floristic studies of North Sikkim, we made special efforts to locate this species described from the region and finally, the species is rediscovered from its type locality as well as from India after more than a century.

The species is very close to *Youngia cineripappa* (Babc.) Babc. & Stebbins (=*Crepis cineripappa* Babc.) and is often separated from it by the nature as well as presence or absence of the indumentum in the phyllaries (Zhu and Kilian, 2011 p 252). A 'form' was also established within this taxon by Babcock (1928) and Babcock and Stebbins (1937) to elucidate the variability. Present study aims to reevaluate the morpho-characterization of *Youngia atripappa* for its proper circumscription.

The species was primarily described based on at least 24 specimens of two gatherings - the syntypes, however, subsequent lectotypification is yet to be accomplished. In this article typification of the species has been done under the provisions of the Code (McNeill *et al*., 2012).

Under these circumstances, present study highlighted lectotypification of *Crepis atripappa* Babc. and rediscovery and proper circumscription of *Youngia atripappa* (Babc.) N. Kilian.

MATERIALS and METHODS

Specimens were collected from Lachen and Thangu areas of North Sikkim. Photographs of habitat and plant habit were taken. Plant specimens were properly preserved, dried, poisoned, and pressed to prepare

herbarium specimens and are deposited at CUH. A few specimens were kept unmounted for detailed study. Flowers were dissected under a stereo binocular microscope for detail characterization and illustrations were done for most of the plant parts. Photographs of floral parts were taken in Leica EZ4 HD stereo zoom microscope fitted with camera. All original materials of the name *Crepis atripappa* Babc. were examined in different herbaria, viz. CAL, P, K, FI, NY, GH either directly or through high resolution images for explanation of typification process. Relevant literatures of the species were examined to elucidate the correct nomenclature and typification.

RESULTS

Typification of the name* Crepis atripappa *Babc.

C. B. Clarke (1876) validated the name *Crepis gracilis*, originally proposed by Sir J. D. Hooker and Thomas Thomson on a herbarium specimen. With the description of the species C. B. Clarke gave his source of knowledge of the species as "Hab. In Sikkim ad 8,000-13,000 ped. alt. leg. J. D. Hook." There is no word "Type" anywhere in Clarke's account. The other relevant texts are: "*Crepis gracilis* Hook. f. et. Th. in Herb. etiam ex Bth. sub nomine Youngia gracili distribute". As he was describing the species in 1876 and the concept of a name having a type only developed toward the end of the 19th century – and, of course, did not enter the International Code until 1935 – Clarke intended to provide information on where the species grew and what specimens existed or by whom it was collected and obviously not anything other. He had also noted that Bentham had distributed specimens of the species as "*Youngia gracilis*".

However, *C. gracilis* Hook. f. & Thomson ex C.B. Clarke is a later homonym due to the preoccupation of the specific epithet '*gracilis*' by another species *Crepis gracilis* Lej. (Rev. Fl. Spa: 249. 1825). Therefore, the name *Youngia gracilis* Hook. f. ex Babc. & Stebbins is illegitimate because Babcock & Stebbins cited the legitimate *Crepis atripappa* Babc. in its synonymy. Moreover, the name is doubly illegitimate because the epithet '*gracilis*', was not available in *Youngia* as the specific epithet was already occupied by the legitimate name *Youngia gracilis* Miq. (in Journ. Bot. Neerl. 1:106.1861).

In this context Kilian (in Zhu and Kilian, 2011) published the new combination *Youngia atripappa* based on *Crepis atripappa* Babc. and stated that "….the epithet of *C. atripappa*, which was included as a synonym by Babcock and Stebbins, is available and has to be taken up (*Vienna Code*, Art. 11.4). *Youngia stebbinsiana*, published by S. Y. Hu (Quart. J. Taiwan Mus. 22: 37. 1969) as a replacement name for *Y. gracilis* of Babcock and Stebbins, was thus nomenclaturally superfluous when published and is therefore illegitimate."

Babcock (1928) published the name "*Crepis atripappa* sp. nov." and listed the illegitimate later homonym "*Crepis gracilis* Hook. f. & Thomson ex C.B. Clarke, Comp. Ind.: 254.1876." as a synonym. Babcock cited "Himalayas: Sikkim, 3000–3600 m. alt. (type locality), *Hooker f. and Thomson* (G, NY)" as type along with two other collections from specific localities in Sikkim. Here 'G' indicates Gray Herbarium (GH) of Harvard University as clarified by Babcock in his 1928 publication and hereafter in discussion G is replaced by GH. Later in a subsequent publication Babcock and Stebbins (1937) considered that the species was better placed in *Youngia* and published "*Youngia gracilis* Hook. f., ex Benth. et Hook. f., Gen. Pl. 2(1): 514, 1873, as nomen nudum", intending it to be based on "Crepis gracilis Hook. f. et Th., ex C. B. Clarke". As that is an illegitimate later homonym, this was, therefore, the replacement name *Y. gracilis* Hook.f. ex Babc. & Stebbins, but as *Crepis atripappa* Babc.was treated as a synonym, *Y. gracilis* is a superfluous and illegitimate name (Art. 52.1; McNeill *et al*., 2012). It is not, however, automatically typified by the type of *C. atripappa* (Art. 7.5 of the ICN, McNeill *et al.*, 2012) as Babcock & Stebbins definitely indicated a type, viz. "Himalayas: Sikkim, 3000 to 3600 m. alt. (type locality), *Hook. f. andThomson* (G *type*, NY, FI cotypes)". This is the same gathering as that designated by Babcock as type of *C. atripappa*, but not exactly the same specimens; indeed a single lectotype, the specimen at GH, is designated for *Y. gracilis*, and so it and *C. atripappa* are not necessarily homotypic becausse the precise lectotypification of the former does not automatically apply to the latter and hence to *Youngia atripappa* (Babc.) N. Kilian. These names will only become homotypic by choice of the same type for *C. atripappa* as that designated for *Y. gracilis* by Babcock & Stebbins (1937).

Presently it is noticed that *Youngia atrippapa* (Babc.) N. Kilian has syntype gatherings comprising two specimens each, those at GH (GH00006291) and NY (NY00278156). While using GH specimen for describing the species *Crepis atripappa* Babc., Babcock evidently discriminated the left–hand side specimen from the right–hand side one as "a" and "a/" respectively. The annotation label on the herbarium sheet (GH00006291) made by him in 1928 corroborates the fact that he treated these two plants on a single sheet as 'two specimens'. Again in 1936 he identified both the specimens of GH as *Youngia gracilis.* Similarly, in 1928 for NY00278156 (NY) Babcock designated the two plants on this single herbarium sheet as "cotypes", i.e. two specimens of *Crepis atripappa* and in 1936 he identified the specimens as *Y. gracilis*.

In these circumstances selection of one of these as lectotype will ensure complete homotypy. After deliberation, GH00006291a is selected and designated here as lectotype

following McNeill *et al.* (2012, Art. 9.2, 9.11 & 9.12).

To date 11 herbarium sheets with 24 specimens representing original material of *Crepis atripappa* have been traced in different herbaria: one at FI (FI010256, with two specimens); one at NY (NY00278156, with two specimens); four at P (P00691294, with two specimens; P00691295, with one specimen; P00691296, with two specimens; P00691297, with two specimens); three at K (K000250157, with four specimens; K000250158, with one specimen; K000250159, with four specimens); one at GH (GH00006291, with two specimens) and one at CAL (acc. no. 255092,with two specimens). Notably in all specimens, however, altitudinal ranges mentioned as "*Herb. Sikkim, 10,000-12,000 ft.*" by Hooker. Obviously the range "*8,000-13,000 ped.*" would cover specimens said to be collected at "*10,000-12,000 ft*". Moreover, nearly all specimens are identified as '*Type*' by Babcock (signature on herbarium specimens). In 1928 he determined some of them as *Crepis atripappa* and in 1936/37 he determined the same specimens as *C.gracilis*.

The citations of the specimens by Babcock (1928) and later by Babcock and Stebbins (1937) indicate that the authors had treated all materials as 'single gathering'. However, at K most of the materials were written as 'collected from Lachen' (a place of North Sikkim). Primarily it is very much confusing that Sir J. D. Hooker collected such a huge number of specimens from a single locality, Lachen, usually mentioned as "*Type Locality*". After critical study of all original materials it becomes clear that at least the specimen(s) K000250158 (K) were collected from Yumthang, which is more than 75 km away from Lachen. However, on the webpage (http://www.kew.org/herbcatimg/49940.jpg) it is referred to as "Sikkim (Guantong)" due to misreading of the word at the right hand top corner where it is written as "Yumthang 12000 ft Sept 6/49" (06-09-1849). Moreover, Lachen specimens were collected on July/August, 1849. Therefore, specimens were collected at least from two localities at two different times and represent at least two gatherings.

However, the matter of how many gatherings might have been involved is irrelevant. The fact is the type cited by Babcock (1928) and by later by Babcock and Stebbins (1937) constitute syntypes. Therefore, lectotypification is needed.

Rediscovery

Youngia atripappa (Babc.) N. Kilian was described from Sikkim (Lachen and Yumthang), India based on the collections of Sir J. D. hooker and Thomas Thomson in the year 1928. Since then though the species was recorded from the neighbouring countries like Bhutan and China, but from India it is never been reported from the other places apart from the type locality, even in Sikkim. The last collection record of the species is before 105 years when Smith and Cave collected it in 1909 from below Thangu (Babcock and Stebbins, 1937). Contemporary collection reports of the species reveal that there are only six specimens represented from India deposited at CAL, viz. *King's collector, s.n.* (1886), *Gammie, s.n.* (1892), *Prain's collector* 333 (1901), *Smith* & *Cave* 981, 2296 (1909), and *Lepcha collector* 2991 (1909). Of course, few of these collections are served as types for other names (Babcock and Stebbins 1937). Apart from these materials, one type specimen of *Crepis atripappa*, Herb. Sikkim, 10,000-12,000 ft. *J.D.H.* (Joseph Dalton Hooker), *s.n.*, acc. no. 255092 is also traced at CAL.

In the recent years (2013–15) several exploration trips were conducted, in pre–, post– and monsoon seasons to Lachen, Thangu and Lachung areas of North Sikkim to locate the species in its natural habitat. After extensive effort few specimens of *Youngia atripappa* (Babc.) N. Kilian were collected in between Lachen and Thangu area, one of the type localities of the species. Thus the present collection of the species forms its rediscovery after a long gap of about 105 years. *Y. atripappa* is very rare in India with a very narrow distributional range in the country. Presently it grows only in Lachen and Thangu areas. This rediscovery proves its existence in the country. The habitats were observed in three successive years, 2013–2015 to elucidate the status of the populations. In 2013, we could able to locate only one population with 4–5 individuals. In the next year in addition to the previous one we found another two populations with 6 and 8 individuals respectively. Notably, in the year 2015 we noticed eight populations having 6, 4, 7, 5, 7, 6, 9, 5 individuals respectively including young plants. Promisingly, the number of populations as well as individuals increased in successive years.

Circumscription

Taxonomically *Youngia atripappa* is well defined with its tall, slender habit, sinuate to zigzag stem, ±15–flowered capitulum, often apically crested inner phyllaries, and fusiform, 15–ribbed achenes. However, during exhaustive characterization of the species based on recent collections as well as collections of 100 years back it reveals that there are several features, often used to separate this species from its close neighbour *Youngia cineripappa* (Babc.) Babc. & Stebbins (=*Crepis cineripappa* Babc.) (see Babcock and Stebbins, 1937:27; Zhu and Kilian, 2011:252), appear either overlapping or rather variable characters.

Y. atripappa was earlier characterized with glabrous peduncles and involucres in contrast with the shortly glandular hairy or rarely glabrous in *Youngia cineripappa*. Close observation discloses the fact that the phyllaries including the peduncles are densely glandular in *Y. atripappa*. Sometimes glandular hairs are present along the submarginal surface of the phyllaries as seen in *Prain's collector* 333 (CAL). Notably cypselas are also with subessile glandular

Table 1. Comparison of selected morphological characters of ***Youngia atripappa***, ***Y. cineripappa*** and ***Y. fuscipappa***.

Character	*Y. atripappa*	*Y. cineripappa*	*Y. fuscipappa*
Rootstock	With few strong secondaries, without fleshy fibres	with fleshy fibres	strong with few secondaries, without fleshy fibres, often stoloniferous
Stem	Sinuate, zig–zag, unbranched or branched at middle or at each node	straight, branched only near top	straight, mostly branched near base, few above middle
Cauline leaves	Well–developed	well–developed	much reduced, linear or bract–like
Peduncle	Densely glandular	fuscous-tomentose and glandular	fuscous-tomentulose
Outer phyllaries	Densely glandular out side	glandular	glabrous
Inner phyllaries	Densely glandular outside, sometimes glands present along submarginal region; glabrous inside	glandular outside; pubescent inside	glabrous or sparsely appressed pubescent inside
	Mid–vein subapically strongly crested	mid–vein not crested	mid–vein subapically strongly winged
Receptacle	Areolate, naked	areolate, low fimbrillate	areolate, naked
Style branch	Yellowish, brownish-black when dry	yellow	green
Cypsela	15–ribbed, with sessile glands	12–ribbed, non-glandular	14–ribbed, non-glandular
Pappus	1 (–sub 2)–seriate	1–seriate	2–seriate

hairs. Similarly, the colour of style branches, pappus colour, pappus series, etc. are also properly interpreted. Babcock (1928) and Babcock and Stebbins (1937) recognized a "Form" with the diagnosis '…..….leaves glabrous, peduncles of fruiting heads prominently striate; involucral bracts becoming spongy-thickened at base; receptacle areolate, the areoles centrally pitted…….' based on the specimen *Prain's collector* 333, a collected specimen from Lachen. All recent collections are with more or less hairy leaves and striate peduncle as well as stem even at early flowering stage. However, receptacle not areolate or pitted as stated earlier. Thus, it may be assumed that these are rather variable characters.

Hooker (1881) treated *Y. atripappa* (as *Crepis gracilis*) as a synonym under *Crepis fuscipappa* Benth. (=*Youngia fuscipappa* Thawaites). However, *C. fuscipappa* is distinct with glabrous habit, straight stem with reduced stem leaves. Therefore, an elaborate description along with detail illustration, field photographs, photographs of stem, floral parts and cypselas are provided here for proper circumscription of the species. Further, a comparison of selected morphological characters of these closely related species, i.e. *Y. atripappa*, *Y. cineripappa* and *Y. fuscipappa* is provided in Table 1.

TAXONOMIC TREATMENT:

Youngia atripappa (Babc.) N. Kilian, Fl. China 20-21: 254. 2011. **Figs.1 & 2**

Basionym: *Crepis atripappa* Babc., Univ. Calif. Publ. Bot. 14: 324. 1928.

Typus: "Himalayas: Sikkim, 3000 to 3600 m. alt. (type locality), *Hook. f. and Thomson* (G [GH00006291, digital image seen], NY [NY00278156, digital image seen])".

Lectotypus (designated here): "Himalayas: Sikkim, 3000 to 3600 m. alt. (type locality), *Hook. f. and Thomson* (GH [GH00006291a, digital image seen]; **iso-** GH [GH00006291a/, digital image seen], NY [NY00278156, digital image seen], FI [FI010256, digital image seen], P [P00691294, P00691295, P00691296, P00691297, digital images seen]; K [K000250157, K000250158, K000250159, digital images seen]; CAL! (acc. no. 255092]

[≡Replaced synonyms:*Crepis gracilis* Hook. f. & Thomson ex C.B. Clarke, Compos. Ind. 254. 1876 & illeg., non Lej. 1825 ≡ *Youngia gracilis* Hook. f. ex Babc. & Stebbins, Publ. Carnegie Inst. Wash. 484:65.1937, nom. superfl. & illeg., non Miq. 1861≡*Youngia stebbinsiana* S.Y. Hu Quart. J. Taiwan Mus. 19(2–3): 223. 1966, nom. superfl. & illeg.].

Perennial herb, to 55 cm high; rootsock strong, short with few secondaries; stem solitary, slender, sinuate to zig–zag, flexuous, erect, branched near from middle, prominently striate, hairy at nodes, otherwise glabrous; lower leaves oblanceolate, 12–14 × 3–4 cm, apex long acumunate, margin coarsely sinuate–dentate, base attenuate to short cuneate to winged petiole, pubescent on both surfaces with multicellular hairs, margin distantly ciliate with multicellular hairs, lower surface pale green; upper leaves similar to lower ones but smaller, 9–10× 2.5–3 cm, elliptic-lanceolate or oblanceolate, gradually narrowed, ultimately bract–like, linear-subulate; synflorescencecorymbiform, with 3–6 capitula; capitulalaticiferous, with ca. 15 florets; peduncles 0.9–1.3 cm, slender, hairy, bracteate apically; bracts one or two; involucre cylindric, 6–7 mm long; outer phyllaries 6–7, broadly ovate, ca. 1×1 mm, apex rounded–obtuse, margin densely glandular, outer surface densely glandular, inner surface glabrous; inner phyllaries 8, oblong to narrowly elliptic, c. 6×1 mm, apex obtuse, margin scarious, bristly towards apex, outer surface densely glandular, inner surface glabrous, midvein subapically crested, margin scarious; florets c. 11 mm long; tube c. 4 mm long, hairy; anther tube c. 3mm long, yellowish brown; style branches yellowish, brownish-black when dry; cypselas 3.5–3.6 mm, fusiform, compressed, strongly attenuate to a short

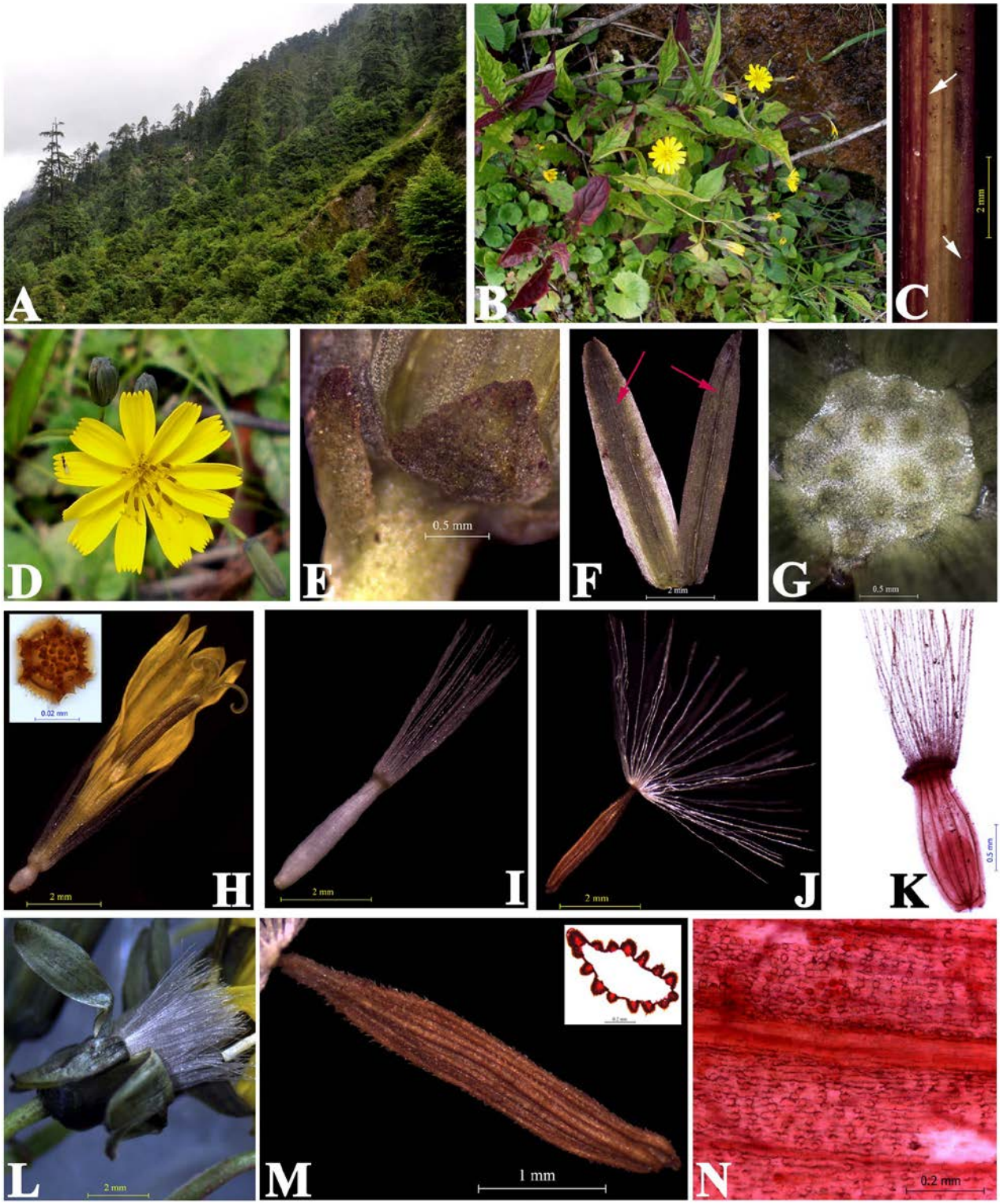

Fig. 1. ***Youngia atripappa*****: A**, Habitat; **B**, Habit; **C**, Stem (note prominent striations, marked with arrows); **D**, Capitulum (note yellowish stigma); **E**, Basal part of glandular involucres; **F**, Inner phyllaries (note distinct dorsal crests marked with arrows); **G**, Receptacle (note absence of areolae); **H**, Floret (note purple pappus) (inset LM of pollen grain); **I**, Immature cypsela (note bright white pappus); **J**, Mature cypsela; **K**, Immature cleared cypsela (note vascular supply); **L**, Fruiting capitulum (note grayish pappus); **M**, Ripe cypsela (inset TS of cypsela) (note alternate ribbing, ribs in triplet); **N**, Portion of cleared inner phyllary with dense glands.

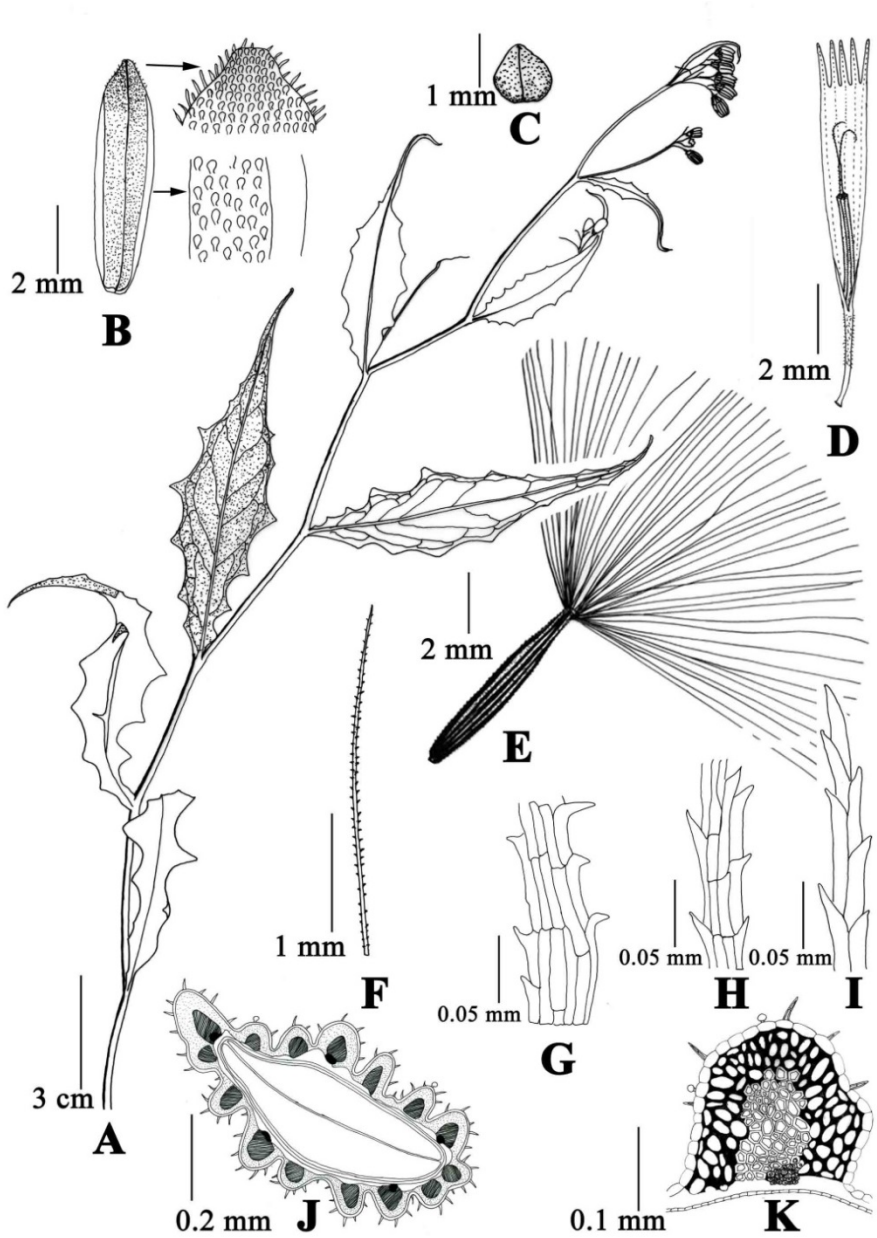

Fig. 2. ***Youngia atripappa*****: A**, Flowering branch (note zig-zag stem); **B**, Inner phyllary with dense glands and bristly apex; **C**, Outer phyllary; **D**, Floret; **E**, Mature cypsela with pappus; **F**, Pappus hair; **G–I**, Cellular view of pappus hair (**G**, Basal; **H**, Middle; **I**, Apex); **J**, T.S. of ripe cypsela (diagrammatic) (note alternate ribbing, ribs in triplet); **K**, Cellular view of stronger rib (note glandular hairs). (Drawing from *Maity* 20273-CUH).

coarse beak (nearly 1 mm long), laticiferous at young; ribs 15 with 5 stronger, arranged in perfect triplets, finely spiculate, more towards beak, mixed with glandular hairs; pappus 4–4.5 mm, purple at anthesis, ultimately turned to ashy gray through shining white in immature cypsela, uniseriate to sub-biseriate, persistent;pappus bristles with 5–6 parallel rows of cells at baseand 4 parallel rows of cells at middle.

Flowering: Jun.–Sep.; *fruiting*: Aug.–Oct.

Distribution: INDIA: Himalaya: Sikkim; BHUTAN; CHINA.

Habitat: Grows on rocky slopes, forest margins in temperate to subalpine forests at 2400–3600 m a.s.l.

Proposed IUCN conservation status in India: Critically Endangered (CR). Repeated exploration revealed that the species is presently growing in eight small populations having 49 individuals. The habitat is also facing tremendous anthropogenic hazards and severely fragmented. Considering this high risk situation we propose the IUCN conservation category Critically Endangered (CR D) for this species in India (IUCN Standards and Petitions Subcommittee, 2014).

***Specimens examined*: INDIA**: Sikkim: Lachen, 3000 m, 10 Jul. 2013, *Maity 20273*; Lachen, 3200 m, 2 Jun. 2014, *Dey 21003*; Lachen to Thangu, 3350 m, 3 Jun. 2014, *Dey 21020*; Below Thangu, 3500 m, 10 Aug. 2015, *Maity, Maiti & Dey 21986, 21987*; Thangu to Lachen, 3400 m, 10 Aug. 2015, *Maity, Maiti & Dey 2199*4, 21998 (all at CUH).

DISCUSSION

The name *Youngia atripappa* (Babc.) N. Kilian is treated as current accepted name of the species following Kilian (Zhu and Kilian, 2011). The circumscription of the species is reassessed with detail description and relevant illustrations to avoid confusion. Simultaneously the variability within the species is established. The typification of a name of a species is crucial in taxonomic research. In the present study the details of original materials of *Crepis atripappa* is also discussed and necessary lectotypification is accomplished.

Y. atripappa is included under the section *Cineripappae* Sennikov of the genus *Youngia* along with its close relatives *Y. cineripappa* and *Y. fuscipappa* (Sennikov and Illarionova, 2008). The ambiguity of these three species regarding the morphological characteristics is resolved.

The type locality, the only place of occurrence of the taxon, Lachen and Thangu of North Sikkim, to date, is facing severe habitat fragmentation due to tremendous anthropogenic activity. In spite of that this particular species is extending its population in recent years, which is very much promising in view of biodiversity conservation in Eastern Himalayan region. Wise attention to this species by relevant authority may provide base line for better conservation management of *Y. atripappa* in this region.

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