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Studies in the Ericoideae (Ericaceae). XV. The generic relationship between *Erica* and *Ericinella*

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Keywords: Africa, *Blaeria*, bract, bracteoles, *Erica*, *Ericinella*, *Philippia*, taxonomy

ABSTRACT

The small African genus *Ericinella* Klotzsch, with one species in Malawi and SW Tanzania and three in the Eastern Cape is shown to exhibit variability in its delimiting characters that overlap with those of *Blaeria* L. and *Philippia* Klotzsch, both of which have recently been included under *Erica*. It is postulated that the genus, like the two above, is unnatural and polyphyletic. The genus is therefore included under *Erica* and the relevant nomenclatural changes are provided: *Erica* **amatolensis** E.G.H. Oliv., nom. nov. (= *Ericinella multiflora* Klotzsch), *E.* **passerinoides** (Bolus) E.G.H. Oliv., comb. nov., *E.* **hillburttii** (E.G.H. Oliv.) E.G.H. Oliv., comb. nov., and *E.* **microdonta** (C.H. Wright) E.G.H. Oliv., comb. nov.

UITTREKSEL

Daar word aangetoon dat die klein Afrika-genus *Ericinella* Klotzsch, met een spesie in Malawi en SW Tanzanië en drie in die oostelike Kaapprovinsie, variasie in sy afbakende kenmerke toon wat oorvleuel met dié van *Blaeria* L. en *Philippia* Klotzsch, wat albei onlangs onder *Erica* geplaas is. Die stelling word gemaak dat die genus, soos die twee hierbo, onnatuurlik en polifileties is. Die genus word dus onder *Erica* geplaas en die nodige naamsveranderinge word gegee: *Erica* **amatolensis** E.G.H. Oliv., nom. nov. (= *Ericinella multiflora* Klotzsch), *E.* **passerinoides** (Bolus) E.G.H. Oliv., comb. nov., *E.* **hillburttii** (E.G.H. Oliv.) E.G.H. Oliv., comb. nov., and *E.* **microdonta** (C.H. Wright) E.G.H. Oliv., comb. nov.

INTRODUCTION

The genus *Ericinella* Klotzsch belongs to the capsular group of African genera of the subfamily Ericoideae which until recently comprised *Erica* L., *Philippia* Klotzsch, *Blaeria* L. and *Ericinella*. The genus *Philippia* has been found (Oliver 1988) to possess a continuous range of variation in the sole distinguishing character between the genera, the fully recaulescent bract in some species, albeit only a few compared to the 757 species in *Erica*. Also it was argued that the genus was not a monophyletic unit. The genus was therefore reduced to synonymy under *Erica* (Oliver 1987, 1992, 1993a; Beentje 1990). As a result, the circumscription of *Erica* became broader with the inclusion of those *Philippia* spp. with stamen complements differing from the basic eight stamens in most *Erica* spp. The most aberrant species of this group is the tropical *Erica nyassana* (Alm & T.C.E. Fr.) E.G.H. Oliv. [= *Philippia nyassana* Alm & T.C.E. Fr.] with only four stamens.

The situation regarding the validity of *Blaeria* as a distinct genus was also examined in the light of its single character difference from *Erica* of four versus eight stamens. It has been shown (Oliver 1993b) that several species of *Erica*, apart from those incorporated from *Philippia*, showed an overlap in the number of stamens. As in the case of *Philippia* it was shown that polyphyletic origins exist for the various species groups currently included within the genus *Blaeria*. As a result, the genus *Blaeria* was reduced to synonymy under *Erica* (Oliver 1993b, 1993c).

ERICINELLA

This genus was described together with many other genera by Klotzsch (1838) in his reclassification of the subfamily Ericoideae. It was based on one species, *E. multiflora* Klotzsch, and was distinguished from other members of the subfamily by a fully recaulescent bract, the zygomorphic calyx condition, and no bracteoles coupled with only four stamens and a 3-locular ovary. The subsequent describing of *Ericinella gracilis* Benth. from Madagascar (Bentham 1839) altered the circumscription of the genus to include a 4-locular ovary. This was compounded by the adding of *E. mannii* Hook. f. from tropical Africa in 1862.

This broader circumscription of the genus was maintained by various workers in their publications for overall treatments of the family or for large floras (Bentham 1839; D. Oliver 1877; Drude 1897; Brown 1905).

When Alm & Fries (1927a) undertook the first complete revision of the genus, they retained only three species, the two Cape ones, *E. multiflora* and *E. passerinoides*, and one from tropical Africa, *E. microdonta* (C.H. Wright) Alm & T.C.E. Fr., which had originally been described as a species of *Blaeria*. They purified the genus by removing what to them were the two discordant elements to *Philippia*, *P. tenuissima* Klotzsch (*E. gracilis*) and *P. mannii* (Hook. f.) Alm & T.C.E. Fr..

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Phillips (1926) retained the genus as circumscribed in *Flora capensis* (Brown 1905) in his *The genera of South African flowering plants*, but later (Phillips 1944) completely changed his concept of the subfamily. In this work he combined *Ericinella* with a number of genera not all closely related, namely *Philippia, Coccosperma* Klotzsch and *Thamnus* Klotzsch, under *Blaeria* L. He retained this treatment in the second edition of *The genera* ... (Phillips 1951). The genus was retained in the same form as used by Alm & Fries (Oliver 1975) and by Ross (1983) in *Flora zambesiaca* with the single species, *E. microdonta*.

As currently construed *Ericinella* is a small genus with the one species, *E. microdonta*, in tropical Africa and the three species, *E. multiflora, E. passerinoides* and *E. hillburttii*, in the Eastern Cape. It is distinguished only by a combination of two characters, the fully recaulescent bract and four stamens.

The fully recaulescent bract is present in a number of Cape genera such as *Salaxis* Salisb., *Coccosperma* Klotzsch, *Scyphogyne* Decne and *Nagelocarpus* Bullock, but these minor genera have an indehiscent fruit. It is also present in the philippioid components now included within *Erica*.

Alm & Fries (1924) and Ross (1957) relied on anther appendages and the shape of the stigma to distinguish *Ericinella* from *Philippia*. These characters are clearly not of any significance in generic delimitation because they are only a reflection of the different pollination syndromes present in the taxa—entomophily *versus* anemophily, both of which are present in many species of *Erica*. It has been pointed out (Rebelo *et al.* 1985; Koutnik 1987; Oliver 1991) that the reduction in flower size, loss of bright colours and the increase in size of the stigma is associated with anemophily in the southern African Ericaceae. To this must be added the loss of anther appendages.

The only difference existing between *Ericinella* and *Blaeria* in tropical Africa is the fully recaulescent bract and lack of bracteoles in the former genus. However, Ross (1980) stated that the bract can be inserted anywhere from near the base of the pedicel to close under the calyx in the tropical species of *Blaeria* [*Erica*] and that bracteoles are only present when the bract is inserted at or below the middle of the pedicel. This would then give the condition of a partially recaulescent bract and no bracteoles which does occur in some specimens of *E. microdonta* that I have examined.

Ericinella microdonta has a 4-locular ovary, whereas the three Cape species of *Ericinella* have 3-locular, very rarely 4-locular ovaries. The very variable Cape species, *Erica equisetifolia* Salisb. [*Blaeria equisetifolia* (Salisb.) Druce, *Blaeria dumosa* Wendl., *Blaeria campanulata* Benth.] possesses flowers with 66% having 3-locular ovaries in the localized montane form [*Blaeria campanulata*]. The 3-locular condition is not confined to the above species; it occurs occasionally in the widespread tropical species *Erica mannii* (Hook. f.) Beentje and of course the Madagascan species, *Philippia gracilis* (Benth.) H. Perrier [*Ericinella gracilis* Benth.] mentioned above. Also Alm & Fries (1927a) had created the subgenus *Afrophilippia* to accommodate two East African species with 3-merous flowers, *P. excelsa* Alm & T.C.E. Fr. [*Erica excelsa* (Alm & T.C.E. Fr.) Beentje] and *P. johnstonii* Engl. [still to be transferred to *Erica*].

DISCUSSION

In the discussion of the African capsular genera (Oliver 1988) it was stated that the relationships within this group of genera are very close, with generic distinctions being based on the flimsiest of morphological characters. This would indicate that the genera have arisen from some ancestral ericoid stock by two processes: the shifting of the bract and bracteoles from axial and partially recaulescent to totally recaulescent; and by the reduction in stamen number from 8 to 4. Both processes were involved in the formation of the species placed under *Ericinella*, whereas in *Philippia*, the first and in *Blaeria* the second process has taken place.

Ross (1957) did not consider the possibility of any close link existing between *Philippia* and *Ericinella*, instead he regarded them as belonging to two separate evolutionary lines in which the zygomorphic calyx, produced by the totally recaulescent bract, has risen independently.

Alm & Fries (1924) when considering the phylogenetic origins of the genera *Philippia* and *Ericinella*, were unable to give any clear lineage for *Ericinella* from either *Philippia* or *Blaeria*. They regarded *E. microdonta* as an outlier of the genus whose origin lay in the region of the Cape Flora.

These arguments are perhaps feasible if one accepts *Ericinella* as a natural, well-defined genus. The tropical species shows a clear relationship with the tropical species of *Erica* that have been placed in the Section *Arsace* (Alm & T.C.E. Fr. 1927b), *Erica arborea* L. and the complex of six species included by Ross (1956) under *E. kingaensis* Engl. as three subspecies. These ericas exhibit reductions in their bract/calyx arrangement and in the number of stamens. They all clearly arose from some ericoid ancestral stock independently of those much further south in the Cape Province.

There is little doubt that the three Cape species are closely related, but not to the tropical species, *E. microdonta*. The Cape species are allied to several Eastern Cape–KwaZulu/Natal species of *Erica* which are placed in the section *Arsace* in the present, rather unsatisfactory, subgeneric classification of the genus. These are *Erica dominans* Killick, *E. dissimulans* Hilliard & B.L. Burtt and *E. anomala* Hilliard & B.L. Burtt. *E. dissimulans* and *E. anomala* both show a strong tendency towards the philippioid reduced calyx. The former species also possesses 3–4-locular ovaries as does *E. dominans*, characters which have not previously been recorded in the species. There is also a relationship with the southeastern Cape species complex based on *Erica simulans* Dulfer, which is placed in the section *Pyronium*. In my opinion the genus *Ericinella*, as it stands, is an unnatural one which is clearly not monophyletic.

The clear and total overlap in the morphological characters of partial versus total recaulescence of the bract, the four stamens and 3- to 4-locular ovary indicates that there can be no separation between the species currently included under *Ericinella* and those which were formerly in *Philippia* and *Blaeria* and are now included within *Erica*. This fact coupled with the independent origin of the two groups of species have led me to reduce the genus to synonymy under *Erica*.

SPECIES & NOMENCLATURAL CHANGES

1. **Erica amatolensis** *E.G.H. Oliv.*, nom. nov.

Ericinella multiflora Klotzsch in Linnaea 12: 223 (1838), non *Erica multiflora* L. (1753) species mediterranea; Benth.: 697 (1839); N.E. Br.: 318 (1905); Alm & T.C.E. Fr.: 45 (1927a). Type: Winterberg near Philippstown (ceded Territory), *Ecklon & Zeyher s.n.* (B, holo.†; BOL!, K!, LD!, P!, UPS!, Z! iso.); ibid., distributed as *Ecklon & Zeyher 257* (G!, MEL!, PRE!, S!, SAM!, W!). Lectotype (selected here): *Ecklon & Zeyher 257* [det. Klotzsch] (S).

Erica amatolensis is most closely related to the more recently described *E. passerinoides* and *E. hillburttii* under which the differences are discussed. These differences are summarised in Table 1.

This species is restricted to the higher mountains of the Eastern Cape Province from the Katberg along the Amatola Range to Stutterheim (Figure 1). It forms erect single-stemmed shrubs up to 1.5 m tall on the edges of forest patches or among woody vegetation on rocky grassy slopes from 1 000–1 600 m altitude and flowers from October to December.

It is the most widespread of the three Cape species discussed here, but does not appear to be abundant where it does occur. For instance on the Katberg Pass, where most records have been made due to easy access, the plants are few and far between. Over its range there does not appear to be any variation of significance in the characters. Occasionally, however, some anthers were noted without any appendages.

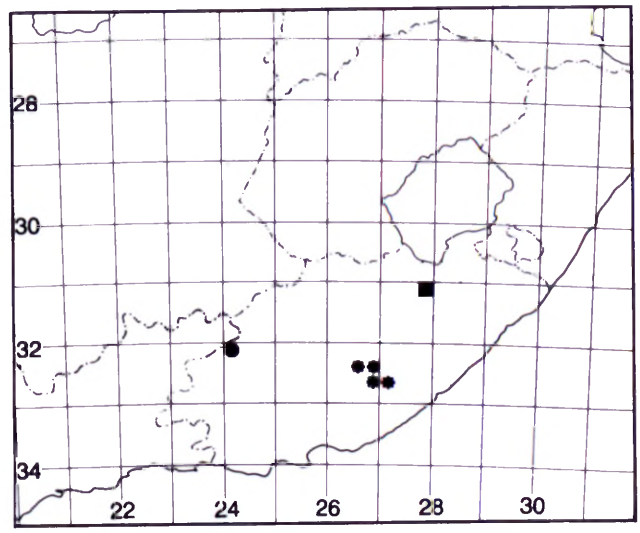

FIGURE 1.—Distribution of the Cape species; *E. passerinoides*, ●; *E. amatolensis*, ✱; *E. hillburttii*, ■.

McMasters (pers. comm.) noted that the bushes in the Gubu Dam area near Stutterheim were inclined to have a running root system from which new plants were produced. This could well indicate that these plants may survive burning by sprouting from the root system. This would then relate to the condition found in *E. hillburttii* with its thick woody rootstock and many stems above ground. All the plants that I have seen in the wild possessed a single stem with regeneration having to take place via seeds only.

The flowers have very rudimentary nectaries at the base of the ovary and only a slightly obconic stigma. Anemophily was clearly evident in the populations on the Katberg Pass where clouds of pollen were produced when

TABLE 1.—Characters which distinguish the three Cape species of *Erica*

	E. hillburttii	*E. amatolensis*	*E. passerinoides*
Habit	multi-stemmed	single-stemmed	single-stemmed
Infrafoliar ridges	often present	absent	absent
Leaves	adaxially pubescent	adaxially evenly pubescent	adaxially evenly pubescent
Sepals	tip sulcate	not sulcate	tip sulcate
Corolla	pink, lobes slightly cucullate	greenish yellow, lobes erect to spreading	pink, lobes straight erect
Stamens	included	manifest to exserted	manifest (?exserted)
Filaments	0.3–0.6 mm long	± 1.4 mm long	± 0.8 mm long
Anthers	terminally attached; seated on ovary	dorsally attached near base; placed well above ovary	terminally attached; placed well above ovary
Anther awns	partially decurrent	free	free, rarely slightly decurrent
Ovary	lanate	pubescent	pubescent
Nectaries	absent	rudimentary	present
Capsule	ellipsoid	broadly ellipsoid	broadly ellipsoid
Seeds	ellipsoid	broadly ellipsoid to subsphaerical	?
Testa cells	elongate with convoluted edges	broader with less convoluted edges	?

the plants were disturbed. It is surprising therefore that the flowers are a striking pink colour and that the exserted anthers often have appendages, features which are associated with entomophily. Insects in the form of bees foraging for pollen only, could perhaps play a minor role in the pollination of this species.

The holotype, *Ecklon & Zeyher s.n.*, was destroyed in Berlin during World War II, and so it was decided to select the numbered collection in Stockholm as the lectotype because it was determined by Klotzsch himself.

Specimens examined

Cotterrell 39 (BOL, GRA); *Ecklon & Zeyher 257* (G, MEL, PRE, S, SAM, W) & *s.n.* (BOL, K, LD, P, UPS, Z); *Esterhuysen 13226* (BOL, NBG, PRE), *13257* (BOL); *Hilliard & B.L. Burtt 10997* (PRE), *12369, 12396* (NU, PRE); *McMasters 8, 10* (STE); *Oliver 7967* (PRE, STE), *8066* (BM, E, MO, PRE, STE); *Rattray 101, 350* (GRA), *in BOL 14244* (BOL); *Sidey 3787* (PRE, S, STE); *Werdermann & Oberdieck 1070* (PRE).

2. **Erica passerinoides** *(Bolus) E.G.H. Oliv.*, comb. nov.

Ericinella passerinoides Bolus in Journal of the Linnean Society of London, Botany 18: 393 (1881); N.E. Br.: 318 (1905); Alm & T.C.E. Fr.: 46 (1927a). Type: Sneeuberg, Koudeveld Mtns, 5000 ft, Dec. 1872, *Bolus 2582* (BOL!, holo.; G!, K!, LD!, SAM!, iso.).

The true identity of *E. passerinoides* remains a problem as the type and only collection does not have fully mature flowers. Thus the true shape of the corolla, the position of the anthers at anthesis and the position of the mature style and stigma cannot be assessed. Fortunately an old capsule remaining from the previous flowering season, although somewhat disintegrated, could be used to reconstruct the characters of the fruit.

Bolus's diaries for that period do not give sufficient details to pinpoint the exact locality. He appears to have collected *en route* from Graaff-Reinet to Murraysburg, presumably not far off the road. Several searches in the area of the highest point of the road over the Sneeuberg and environs to the north and south have proved unsuccessful. Another species of Ericaceae, *Philippia tristis* Bolus (= *Erica caespitosa* Hilliard & B.L. Burtt), also known from its type collection gathered at the same locality on the same day, has not been re-collected in that vicinity either. As farms now stretch right to the summit of these mountains where burning and overgrazing are very evident, it is likely that both species have been exterminated in the area.

Alm & Fries (1927a) retained the species with some hesitation as they felt that it was only a young stage of *E. amatolensis* (*E. multiflora*). However, a thorough examination of the type has revealed a number of characters which point to the distinctness of *E. passerinoides* from *E. amatolensis* (see Table 1). Brown (1905) used the corolla shape and degree of exsertion of the style to separate the two Cape species. Alm & Fries on the other hand used the shape of the calyx lobes and leaf length to separate them. These characters are of no real value in distinguishing the species.

Until the material is found again in the wild I am retaining *E. passerinoides* as a distinct species.

Specimen examined

Bolus 2582 (BOL, G, K, LD, SAM).

3. **Erica hillburttii** *(E.G.H. Oliv.) E.G.H. Oliv.*, comb. nov.

Ericinella hillburttii E.G.H. Oliv. in Bothalia 16: 46 (1986). Type: Cape, Elliott Dist., Bastervoetpad between Saamwerk and Mt Enterprise, 2 130 m, 16 November 1983, *Oliver 8151* (PRE, holo.!, BM!, BOL!, E!, GRA!, K!, MO!, NBG!, NU!, NY!, S!, STE! iso.).

This species forms erect multi-stemmed shrubs up to 1.5 m tall and occurs on rocky, grassy slopes at high altitude in the mountains northwest of Elliott in the Eastern Cape. It flowers from October to December.

E. hillburttii was discovered as recently as 1983 by Hilliard & Burtt. It is known to date from only one locality, the Bastervoetpad. Accessibility in these mountains is very limited, therefore additional populations could well be discovered in the future farther north towards Naude's Nek.

The species is easily distinguishable from its nearest ally, *E. amatolensis*, on a number of characters (Table 1). The most noticeable of these characters in the field are the multi-stemmed habit, greenish yellow colour of the flowers and the included stamens. Examination of a flower will show the relatively short filaments with broad apex on which the awns are decurrent and the lanate ovary.

The total lack of any nectaries below the ovary, the broadly funnel-shaped stigma and the inconspicuous dull-coloured flowers clearly point to anemophily in this species. This syndrome could not be tested in the field because of the wet overcast weather prevailing when the type material was collected.

Specimens examined

Hilliard & B.L. Burtt 16662 (STE); *Oliver 8151* (BM, BOL, E, GRA, K, MO, NBG, NU, PRE, S, STE).

4. **Erica microdonta** *(C.H. Wright) E.G.H. Oliv.*, comb. nov.

Ericinella microdonta (C.H. Wright) Alm & T.C.E. Fr. in Acta Horti Bergiani 8: 262 (1924); Alm & T.C.E. Fr.: 46 (1927a); Brenan: 494 (1954); R. Ross: 174 (1983). *Blaeria microdonta* C.H. Wright: 272 (1897). Types: Malawi, Mlanje Distr., Mt Mlanje, 1 800 m, *McClounie 55, 75* & *95* (K!). Lectotype (selected here by R. Ross pers. comm.): *McClounie 55* (K).

E. shinniae S. Moore: 287 (1916). Type: Malawi, Mlanje Dist. *Shinn s.n.* (BM!, holo.).

E. brassii Brenan: 494 (1954). Type: Malawi, Mlanje Dist. Mlanje Mtn, Luchenya Plateau, 1 870 m, June 1946, *Brass 16454* (K!, holo., BM!, MO!, PRE!, SRGH, iso.).

E. microdonta var. *craspedotricha* Brenan: 495 (1954). Type: Malawi, Mlanje Dist., Mlanje Mtn, southwest ridge, 2 400 m, June 1946, *Brass 16497* (K!, holo.; MO!, PRE!, SRGH, iso.).

This species is from tropical Africa where it occurs mostly on high ground in Malawi, just getting into SW Tanzania (Figure 2). Ross (1983) recorded the species as forming shrubs up to 3 m tall. Brass, on his various collections, records the plants as occasional to plentiful, sometimes gregarious, in grassland on the edges of rainforest and on rocky banks of streams subject to flooding. One plant he recorded as a tree 4 m tall. I can confirm these observations from my examination of plants on Mt Mulanje.

Of the species listed here *E. microdonta* is by far the most variable. The populations in central Africa were regarded as comprising two distinct species, one with a variety (Brenan 1954). The variation in the size and form of the corolla is considerable, the smallest flowers being from the type of *E. brassii* Brenan and appearing very distinct. However, Ross (1983) after examining a considerable number of specimens from the whole area regarded the variation in the indumentum on the branchlets, leaf indumentum, leaf size, corolla size and stigma diameter as of no taxonomic significance. He recognized only one species with no varieties, and this view I support.

E. microdonta possesses well-developed nectaries below the ovary, a poorly developed funnel-shaped stigma and partially exserted anthers with appendages. This would clearly indicate entomophily as the pollination syndrome. During a visit to a few populations on Mt Mulanje in Malawi during 1991, I was unable to record any instance of the mass scattering of pollen from the white flowers, but noted no visitation by any insect.

In correspondence some time ago on the lectotypification of this species, which had not been done for *Flora zambesiaca*, Ross recommended that *McClounie 55* was the best specimen to select. I therefore attribute the above selection to him.

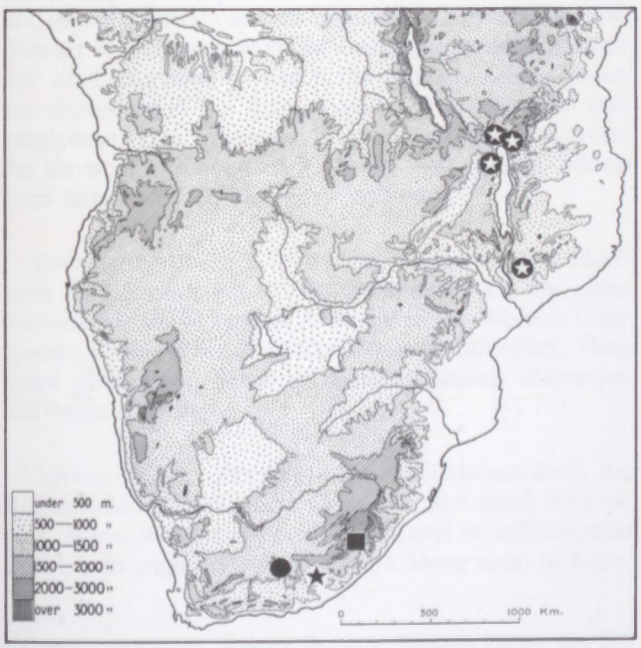

FIGURE 2.—Distributions of the species; *E. passerinoides*, ●; *E. amatolensis*, ★; *E. hillburttii*, ■; *E. microdonta*, ✪.

Specimens examined

Brass 16416, 16446, 16454 (MO, PRE), *16502* (MO), *16770* (MO, PRE), *16852* (MO, PRE); *Goodier 269* (PRE), *289* (PRE); *Goyns 45a* (PRE); *Oliver 9816* (STE); *Phipps 2787* (PRE).

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