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The Metaxiinae dredged by the CANCAP expeditions, with the new species Metaxia carinapex and Metaxia hapax from the Cape Verde Islands (Gastropoda, Heteropoda: Triphoridae)

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Some data concerning the species *Metaxia metaxae* (Delle Chiaje, 1828) and *Metaxia abrupta* (Watson, 1880) are given. The shells of *Metaxia carinapex* spec. nov. and *Metaxia hapax* spec. nov. are described and compared with those of the preceding two species. There is no reason to maintain the nominal species *Metaxia incerta* Fernandes & Rolan, 1988, in addition to *M. metaxae.*

Key words: Gastropoda, Heteropoda, Triphoridae, *Metaxia*, taxonomy, East Atlantic.

INTRODUCTION

The many samples of Metaxiinae, dredged by the NNM-CANCAP expeditions (1976-1988) have made it possible to give some additional notes on *Metaxia metaxae* (Delle Chiaje, 1828) and *M. abrupta* (Watson, 1880), although these species have been described in detail by Bouchet (1984). After careful examination of the specimens of *M. metaxae* dredged from considerable depths (120-466 m), the forma *excavata* Locard, 1897, cannot be maintained. A relationship between colour or convexity of the whorls of the specimens, according to Bogi & Nofroni (1986), and the depth where they live, has not been proved. In the opinion of Fernandes & Rolan (1988), *Metaxia incerta* Fernandes & Rolan, 1988, differs from *M. metaxae* by its darker brown colour, its protoconch with half a whorl more and the smaller diameter of the protoconch whorls. The first character has not been proved and the second does not always hold true. The only remaining character, a smaller diameter of the protoconch whorls, seems to me insufficient to maintain a separate species. The large quantity of *M. abrupta* and the finding of rather fresh shells gives more information about the colour of the shells and the microsculpture of the protoconch. Furthermore, at this moment we have a better view on the variability of the characters of this species, by which it is possible to recognize *M. hapax* as a new species. As the name suggests, *M. carinapex* spec. nov. differs from all other East Atlantic Metaxiinae by its strong carina on the last part of the protoconch.

Abbreviations: LH = J. van der Linden collection, The Hague; NNM = Nationaal Natuurhistorisch Museum, Leiden.

SYSTEMATIC PART

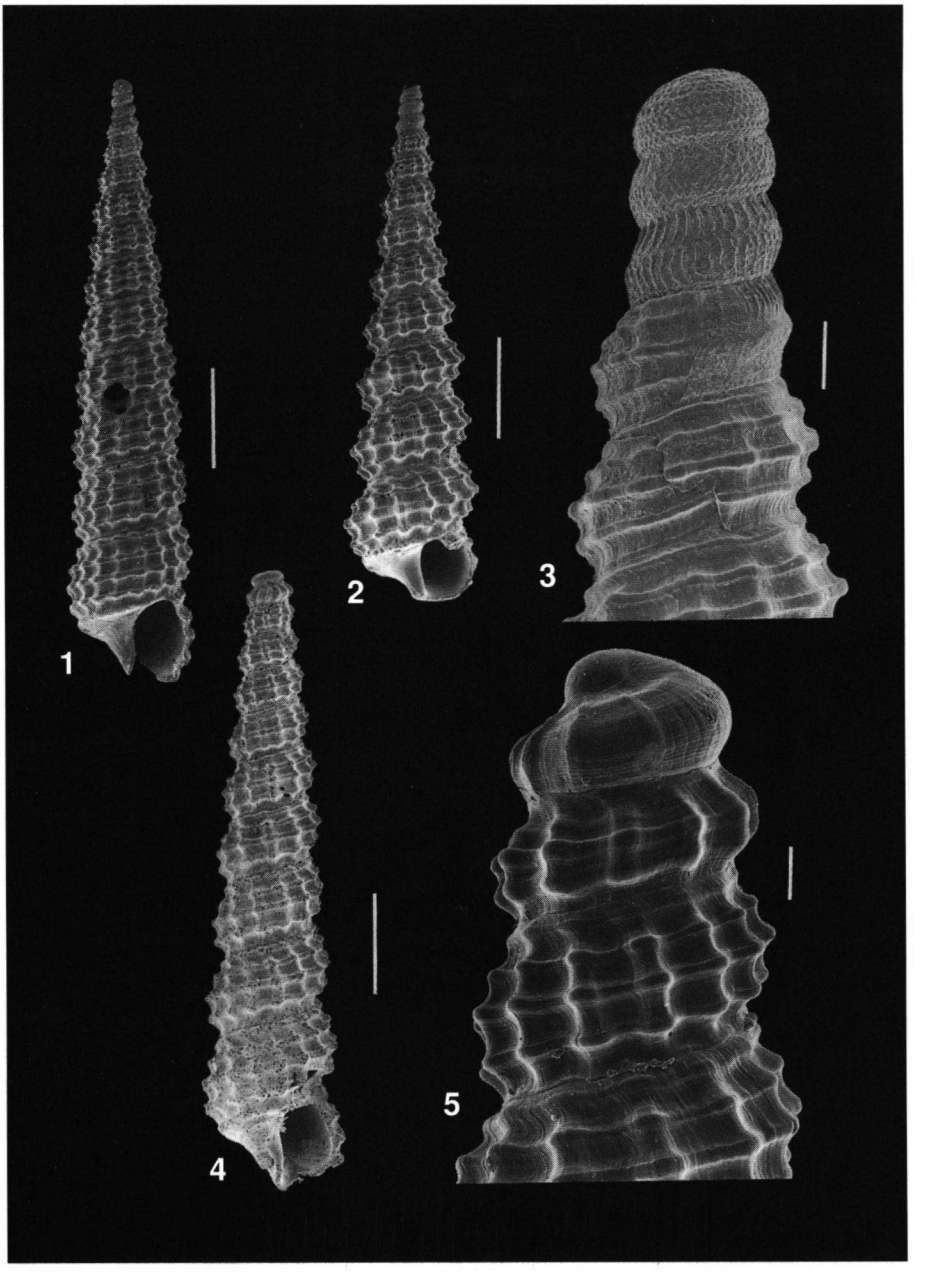
Metaxia metaxae (Delle Chiaje, 1828) (figs. 1-3)

The many samples (59; 174 specimens), dredged by the NNM-CANCAP expeditions, give a good overview of the various characters of this species. It is not feasible to make SEM photographs of all the shells, but with 30x magnification there are no observable differences in the microsculpture of the protoconchs. Furthermore, *M. metaxae* is rather variable: the number of protoconch whorls ranges from 3.5 to almost 5 (contrary to Bouchet, 1984, who quotes 3 whorls, although his SEM photograph shows 3.5 whorls). Bouchet states that the protoconch has a brown colour, darker than the brown teleoconch. I observe that all the shells from the Madeira and Selvagens archipelago (34), from W. Morocco (1) and from the Canary Islands (52) have a protoconch of the same colour as the teleoconch (yellow-white to dark orange), sometimes a shade darker or even somewhat lighter. Only the specimens from the Cape Verde Islands (87) often have a remarkable, darker protoconch. However, I have not observed any relationship with the colour of the teleoconch: there are yellow-white shells with a dark brown protoconch and yellow-orange specimens with a protoconch of almost the same colour. All specimens from Madeira have the same coloured teleoconch (orange), contrary to those from the Canary and the Cape Verde Islands, which vary from nearly white to dark orange (often differently coloured shells in one sample).

The teleoconch is variable in shape too. Sometimes one can find specimens with very flat whorls and shells with convex whorls in a single sample; there are shells with almost spiny tubercles on the spiral ribs, or more rounded nodules, or even nearly smooth spirals on the uppermost teleoconch whorls. The many *M. metaxae* dredged from considerable depths (from between 100 and 500 m) show the same variation in characters as the littoral specimens: Cape Verde Islands, depth 400-430 m, colour light orange, one shell with flat whorls, the other one with convex whorls; Madeira, depth 228-240 m, orange shells; Madeira, depth 340 m, yellow-orange shells, one with very flat whorls, the other with convex whorls and the third one with intermediate whorls. Because there is no question of uniform characters in relation to the nominal taxon, neither within the distribution area of *M. metaxae*, nor in relation to the depth, there is no reason to maintain a separate forma (forma *excavata* Locard, 1897) of this species.

Fernandes & Rolan (1988) have introduced the new species *Metaxia incerta*, from the Cape Verde Islands. Though they have collected about forty living specimens, the authors have examined the colour of the animals only: milky-white for both *M. metaxae* and *M. incerta*. So, the differences between these two species are the characters of the shells. First of all, the colour of the teleoconch is dark brown for *M. incerta* and lighter red-brown for *M. metaxae* (living specimens). Although both species have exactly the same peculiarly sculptured protoconch, there are two differences: *M. metaxae* has a protoconch (without nucleus) of 3 to 3.5 whorls and *M. incertae* of about 4 whorls (this is not confirmed by the photographs of Fernandes & Rolan; on plate III figs. 13-14, both species have 4 whorls, the nucleus included). Furthermore, the diameter of the first protoconch whorl of *M. metaxae* is on average (after six shells) 0.176 mm and of *M. incerta* (after five shells) 0.142 mm.

However, having examined dredged, dead specimens only, I came to somewhat other conclusions after study of about forty specimens of *M. metaxae* s.l., with a complete protoconch, from the Cape Verde Islands. The colour of these shells varies from dirty yellow-white to dark orange-brown. There is no relationship between the number of



Figs. 1-5. East Atlantic *Metaxia* species. 1-3, *M. metaxae* (Delle Chiaje, 1828); 1-2, Morocco, off Cap Blanc du Nord, depth 105 m, two specimens from the same sample. 1, specimen with flat whorls, colour orange-brown, length 6.1 mm; 2, shell with convex whorls, colour white-yellow, length 5.3 mm. 3, protoconch of a specimen dredged SE. of Madeira, depth 101 m. 4-5, *M. abrupta* (Watson, 1880), Azores, E. of Faial, depth 110 m; 4, length 6.4 mm; 5, protoconch of another specimen from the same locality. All specimens in NNM. Scales figs. 1, 2 and 4 : 1 mm; figs. 3 and 5: 0.1 mm.

whorls of the protoconch (including the nucleus) and the colour of the specimens: there are dark orange-brown shells with only 4 protoconch whorls and yellow-white specimens with 5 whorls (even 5,2 whorls in the sample CANCAP Sta. 6.010).

I have measured a smallest diameter of the first protoconch whorl of 0.16 mm (and not 0.14 mm); about 35 shells have a diameter of between 0.16 and 0.18 mm. Only four specimens have a first protoconch whorl with a diameter of between 0.19 and 0.22 mm (and not 0.176 mm), all in combination with a short protoconch of 3.5 to 4.0 whorls, but with a teleoconch varying in colour from dark orange-brown to yellow-white. Moreover, there are shells with 4 protoconch whorls (nucleus included), which have a diameter of just 0.17 mm. Therefore I consider *M. incerta* Fernandes & Rolan, 1988, a junior synonym of *M. metaxae* (Delle Chiaje, 1828), although the measured shells (about thirty) dredged off the Canary Islands and Madeira all have a protoconch of 3.5 to 4.0 whorls and a diameter of the first whorl of 0.20 to 0.23 mm. On the other hand, the author has two specimens, collected from shell-grit washed ashore at Laredo (Santander), NW. Spain, with a protoconch of about the same diameter (0.17 mm) as the specimens with the smallest diameter from the Cape Verde Islands, both with 4 protoconch whorls.

Nevertheless, a protoconch of one whorl more or less and a first, more or less inflated, protoconch whorl, seems to me insufficient to introduce a new species, particularly since both have an identically sculptured protoconch [compare,for example, the protoconch of *Cerithiella metula* (Lovén, 1846) in Bouchet & Warèn, 1993, figs. 1311-1315].

M. metaxae has not been dredged around the Azores and off Mauritania.

Metaxia abrupta (Watson, 1880) (figs. 4-5)

A total of 202 shells from 37 localities was studied. This species has been dredged exclusively around the Azores at depths of 40 to 620 m. The largest samples (10-30 specimens) are from 80-140 m depth. The maximum height is 6.3 mm. Compared to *M. metaxae*, the variability of *M. abrupta* is limited: the colour of fresh shells is white, semitransparent; old empty specimens become opaque dirty white to yellow-white. The protoconch is of the lecithotrophic larval type: only 1.5 to 2.0 broad whorls, blunt-tipped and ruggedly sculptured (fig. 5). Because the first teleoconch whorl is, compared to that of *M. metaxae*, also much broader, the profile of *M. abrupta* is much more cylindrical than that of *M. metaxae*. Thanks to the many fresh shells, we now have a more complete knowledge of the microsculpture of the protoconch: the first half whorl has numerous minute spiral lines only, which continue on the subsequent whorl, where they are crossed by well-spaced, flexuous and rather strong axial ribs. There is no distinct demarcation between protoconch and teleoconch. The teleoconch only shows some slight variation: the whorls are often rather convex, sometimes more flattened. They are shorter than those of *M. metaxae*; at the same length (without protoconch) of 6 mm, the last-mentioned species has two extra whorls.

As far as known, *M. abrupta* is the only representative of the Metaxiinae around the Azores.

Metaxia hapax spec. nov. (figs. 6-7)

Type material. - Holotype: NNM 57611, Cape Verde Islands, W. of Fogo, 14°55' N 24°31'W, depth 38-55 m (CANCAP 1982, Sta. 6.040); length 2.7 mm (no paratypes).

Description. - The protoconch is of the lecithotrophic larval type and is approximately intermediate between that of *M. abrupta* and the following species, *M. carinapex*. Like *M. carinapex*, it has about 2.5 whorls, the same diameter and height. On the other hand, the sculpture is about the same as that of *M. abrupta*: the first half whorl seems to be smooth at 30x magnification [even on SEM photographs (cf. Bouchet, 1984) most of the specimens of *M. abrupta* have a seemingly smooth first part of the protoconch too, which may be the result of age and/or wear] and the subsequent whorls have a sculpture of sinuous, opisthocline axial ribs. The features of the teleoconch are similar to those of *M. metaxae* (at least the specimens with more convex whorls) and of *M. carinapex*. The teleoconch of the holotype has about five whorls. The complete shell has a pale orange colour.

Derivatio nominis. - ἅπαξ, hapax (Greek), one only, referring to the single specimen.

Discussion. - *M. hapax* differs from *M. abrupta* by its colour (never darker than yellow-white in *M. abrupta*) and by its protoconch. *M. abrupta* has a much broader protoconch (0.5 versus 0.3 mm) of 0.5 to 1.0 whorl less, which merges imperceptibly into the teleoconch, while the transition is clearly defined in *M. hapax*. The teleoconch of *M. hapax* is more conical, the diameter of, at least, the first two whorls is smaller; the whorls are somewhat more convex and the suture is wider. Moreover, the ranges of both species are separate: as far as we know *M. abrupta* is restricted, as the only representative of the Metaxiinae, to the Azores.

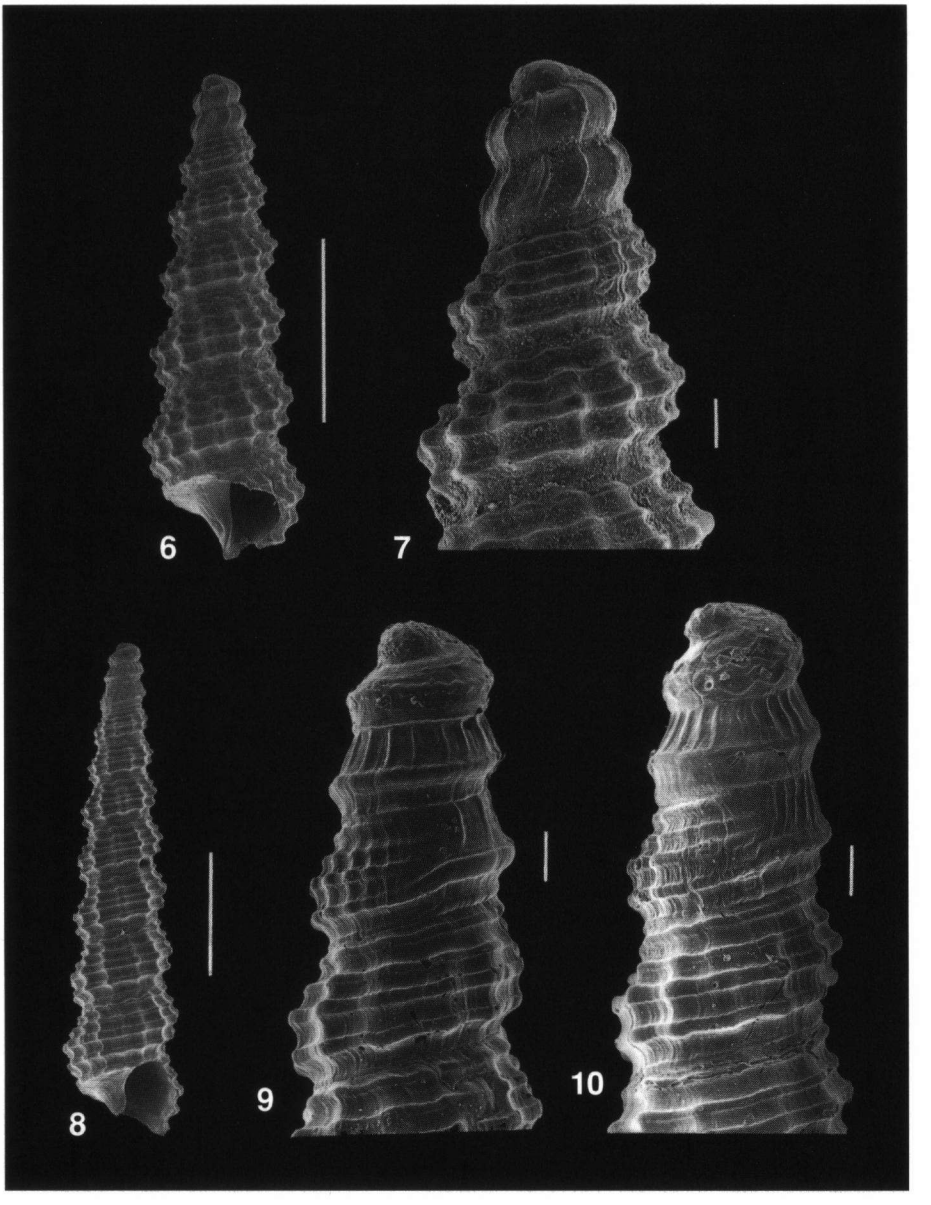
M. hapax differs from *M. metaxae* mainly in its protoconch. *M. metaxae* has a styloid protoconch of the planktotrophic larval type with a completely different microsculpture.

Differences with *M. carinapex* are shown below.

Metaxia carinapex spec. nov. (figs. 8-10)

Type material. - Holotype: NNM 57612, Cape Verde Islands, S. of São Vicente, 16°47'N 25°02'W, depth 50 m (CANCAP 1982 Sta. 6.130); length 4.1 mm.

Paratypes: Cape Verde Islands, W. of Boa Vista, 16°10'N 23°01'W, depth 74 m (CANCAP 1986 Sta. 7.080) (NNM 57613/12; LH/3); SW. of Boa Vista, 15°53'N 23°00'W, depth 76 m (CANCAP 1982 Sta. 6.068) (NNM 57614/3); SE. of Cima, 14°57'N 24°39'W, depth 225 m (CANCAP 1986 Sta. 7.028) (NNM 57615/2); ibidem, 14°57'N 24°39'W, depth 165 m (CANCAP 1986 Sta. 7.030) (NNM 57616/3); ibidem, 14°57'N 24°38'W, depth 65 m (CANCAP 1986 Sta. 7.032) (NNM 57617/1); W. of Fogo, 14°55'N 24°31'W, depth 60 m (CANCAP 1982, Sta. 6.041) (NNM 57618/1); S. of Razo, 16°36'N 24°36'W, depth 140-160 m (CANCAP 1986 Sta. 7.119) (NNM 57619/4); ibidem, 16°36'N 24°37'W, depth 208 m (CANCAP 1986 Sta. 7.120) (NNM 57620/2); ibidem, 16°36'N 24°37'W, depth 200-230 m (CANCAP 1986 Sta. 7.121) (NNM 57621/4; LH/2); W. of Sal, 16°46'N 23°01'W, depth 354 m (CANCAP 1986 Sta. 7.100) (NNM 57622/1); ibidem, 16°46'N 23°02'W, depth 85 m (CANCAP 1986 Sta. 7.110) (NNM 57623/1); S. of São Nicolau, 16°33'N 24°16'W, depth 405 m (CANCAP 1986 Sta. 7.129) (NNM 57624/5); SW. of São Tiago, 14°54'N 23°38'W, depth 420 m (CANCAP 1986 Sta. 7.007) (NNM 57625/2); S. of São Tiago, 14°54'N 23°38'W, depth 700 m (CANCAP 1986 Sta. 7.008) (NNM 57626/2); ibidem, 14°53'N 23°30'W, depth 150



Figs. 6-10. East Atlantic *Metaxia* species. 6-7, *M. hapax* spec. nov., holotype (NNM 57611). 8-10, *M. carinapex* spec. nov. 8, holotype (NNM 57612); 9-10, protoconchs of two paratypes from the same locality: Cape Verde Islands, S. of Razo, depth 208 m (NNM 57620). Scales figs. 6 and 8: 1 mm; figs. 7, 9 and 10: 0.1 mm.

m (CANCAP 1982 Sta. 6.015) (NNM 57627/1); S. of São Vicente, 16°45'N 25°02'W, depth 100-120 m (CANCAP 1982 Sta. 6.134) (NNM 57628/1); ibidem, 16°46'N 25°04'W, depth 150 m (CANCAP 1982 Sta. 6.138) (NNM 57629/1); SW. of São Vicente, 16°47'N 25°06'W, depth 293 m (CANCAP 1982 Sta. 6.149) (NNM 57630/1).

Description (after 53 shells from 19 localities). - The shell of the holotype has somewhat more than 2.5 protoconch whorls of the lecithotrophic larval type, and almost 8 teleoconch whorls. The colour is light yellow-brown; the shell is semitransparent, with a somewhat lighter protoconch. The first part of the protoconch has five or six equidistant spiral riblets, of which the last one to three are zigzag-shaped. After about half a whorl these become less obvious and disappear, except for the most abapical one which, contrary to the others, becomes more and more prominent, to such a degree that about the last 1.5 whorls of the protoconch are carinate (therefore the name *M. carinapex*). This keel lies below the middle of the whorl. Above the keel there are little flexuous axial ribs, rather distant from each other. Below the carina the whorl is smooth. Around the transition to the teleoconch the keel suddenly makes a dip in abapical direction and becomes the fourth spiral cord of the teleoconch whorls.

The teleoconch has rather convex whorls and a deep and wide future. There are five spirals, the first four are nodulous, the last one is smooth. The first spiral and the fifth spiral of the preceding whorl are both close together, within the suture, the last spiral just adapical from the centre of the suture, the first spiral underneath. The siphonal canal is short and wide, situated in the direction of the longitudinal axis of the shell.

Distribution. - As far as known only dredged around the Cape Verde Islands in depths from 50 to 700 m.

Discussion. - There is some variation in characters of the protoconch: (1) sometimes there are 3 instead of 2.5 whorls; (2) the spiral ribs on the first part of the protoconch are sometimes a little granulated and/or the last one is a zigzag spiral thread; (3) the keeled spiral descends gradually (instead of abruptly with a sudden dip) to the basis of the whorl; (4) on some shells there are, below the carina, also a few very vague axial riblets.

The characters of the teleoconch are rather constant, except for the colour which varies from semitransparent white to orange. The greater part of the shells is yellow-white, with a protoconch of the same colour; only the darker specimens sometimes have the protoconch a little lighter. The largest shell has a length of 4.7 mm.

The teleoconch of *M. carinapex* has approximately the same characters as that of *M. metaxae*, although the first species never has flat whorls and its suture is somewhat wider. Nevertheless, the differences are insignificant and it is impossible to separate the specimens of both nominal species without a protoconch, when they are found together in one sample as happened frequently (the same applies to the teleoconch of *M. hapax*). On the other hand, the protoconchs of both species represent different larval types (figs. 3 and 10). The styloid protoconch of about 4 whorls of *M. metaxae* differs remarkably from that of *M. carinapex*.

M. abrupta, only known from the Azores, has a much broader protoconch (and first teleoconch whorl), which is 0.5 to 1.0 whorl shorter and lacks the conspicuous carina.

M. hapax differs from *M. carinapex* by its protoconch too (which has no keel) and by its continuous riblets over the total height of the whorls.

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