

Silurian Tabulate Corals *Eofletcheria* and *Aulocystis* from the Gionyama Formation, Miyazaki Prefecture

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Abstract Recent collections of the Silurian tabulate corals from the Gionyama Formation, Miyazaki Prefecture include many undescribed species. Two new species of lyoporide lichenariids *Eofletcheria adachii* and *E. nipponica*, and an aulocystide auloporphid *Aulocystis* sp. indet. are described in this report. Their stratigraphic settings are as follows: limestone conglomerate of the G2 Member (*Eofletcheria adachii*) and massive limestone of the G3 Member (*E. nipponica* and *Aulocystis* sp. indet.). *Aulocystis* sp. indet. represents the first record of the genus from Japan.

Key words: Gionyama Formation, new species, Silurian, tabulate corals, taxonomic descriptions.

Introduction

The Gionyama Formation was named by Saito and Kanbe (1954) for *Halysites*-bearing limestones and their associated siliciclastic sediments of the Kuraoka area in Gokase-machi, Nishiusuki-gun, Miyazaki Prefecture, southern Japan. Hamada (1956, 1958, 1959 a, b) examined the detailed stratigraphy and macropaleontology, including corals, brachiopods and trilobites, of the formation, and subdivided into the G1 to G4 Members, the ages of which units were regarded as the late Wenlock (Early Silurian) to the G2 Member and the early Ludlow (Late Silurian) to the G3 Member, respectively. The G1 and G4 Members are barren of macrofossils. He described eight species of halysitids from the Gionyama Formation, however recent collections reveal that there are many previously unknown species of tabulate corals in the formation. This report, documenting the two new species of *Eofletcheria* together with an undetermined species of *Aulocystis*, represents one of a series on the Gionyama tabulate coral fauna. The present specimens were collected from dark-colored (usually gray-green to black) pebble size limestones in limestone conglomerate with sandy matrix of the G2 Member or light rose-colored massive limestones of the G3 Member at three localities in the Kuraoka area (Fig. 1). Although all collections were made from talus, their characteristic lithology make it possible to designate stratigraphic position for each specimens.

The tabulate coral specimens studied are deposited in the National Science Mu-

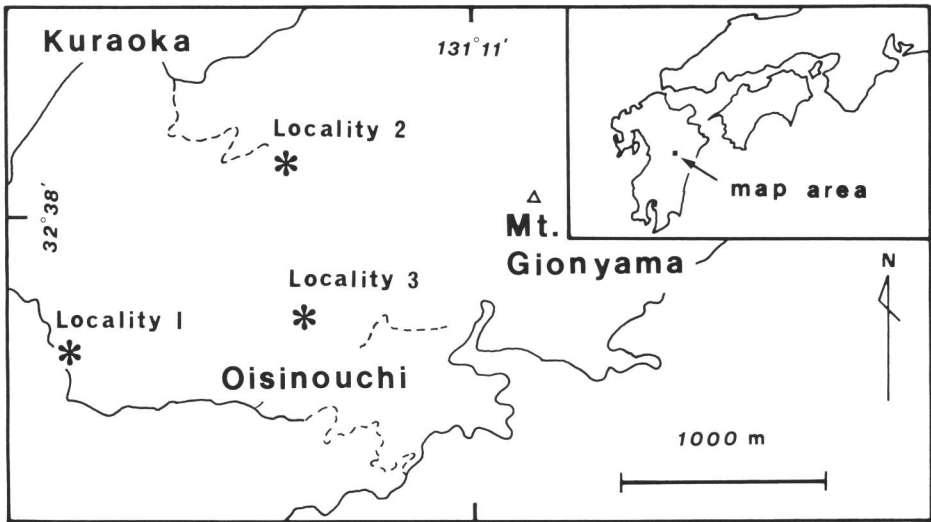


Fig. 1. Index map of the Kuraoka area, Miyazaki Prefecture showing coral localities.

seum, Tokyo.

Systematic Paleontology

Order Lichenariida Sokolov, 1950

Family Lyoporidae Kiaer, 1930

Subfamily Eofletcheriinae Sokolov, 1955

Genus *Eofletcheria* Bassler, 1950

Type species: *Columnaria incerta* Billings, 1859.

Eofletcheria adachii n. sp.

(Figs. 2 A–E, 3 A, B)

Eofletcheria sp., Adachi and Niko, 1996, p. 67, 68, fig. 1.

Holotype: NSM PA14267, from which five thin sections were made.

Other specimens: Seventeen thin sections were studied from the eight paratypes NSM PA14271–14275, 14278, 14281, 14282. In addition, eleven specimens, NSM PA14268–14270, 14276, 14277, 14279, 14280, 14283–14286, were also examined.

Diagnosis: Species of *Eofletcheria* with usually phacelo-ceriod coralla and lacunae; diameter of corallites approximately 1.0 mm; corallites strongly flexuous; tabulae dense, complete tabulae nearly horizontal.

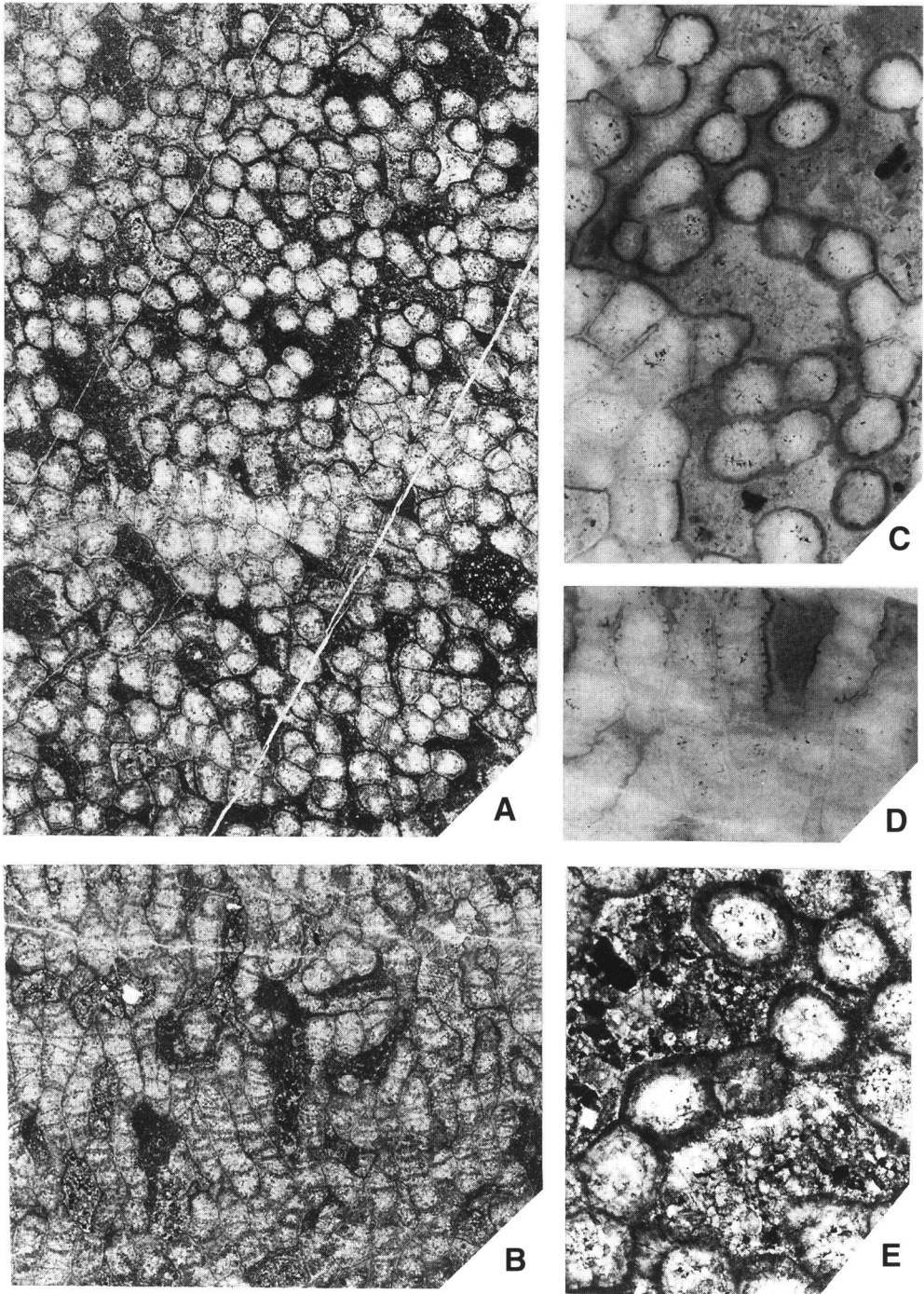


Fig. 2. *Eofletcheria adachii* n. sp., holotype, NSM PA14267, thin sections. A, C, E, transverse sections, note radially fibrous wall structure in E; B, D, longitudinal sections. A, B= $\times 5$; C, D= $\times 10$; E= $\times 14$.

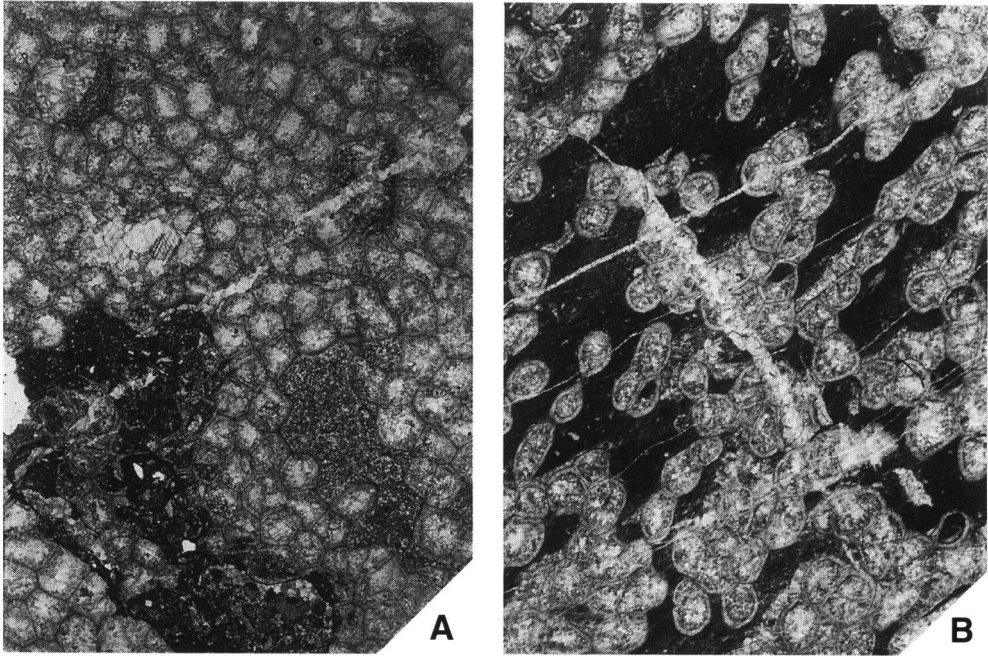


Fig. 3. *Eofletcheria adachii* n. sp., thin sections. A, paratype, NSM PA14274, transverse section representing relatively proximal corallum. B, paratype, NSM PA14273, transverse section representing relatively distal corallum. All $\times 5$.

Description: Coralla domed in growth form with maximum observed size 63 mm diameter and 49 mm high, usually phacelo-cerioid with cateniform portions composed of up to 8 corallites; cerioid portions have some tendency to well develop in proximal coralla, where area of partial adhesion of corallites attains approximately 2 cm²; lacunae frequently recognized in cerioid portions, subelliptical to somewhat irregular in transverse section; each corallites cylindrical or prismatic with strong flexuosity, transverse section of corallites circular in phaceloid portions, usually hexagonal in cerioid portions and subcircular to nearly tetragonal in cateniform portions, moderate size for genus, 0.6–1.4 mm, with mean 1.0 mm in diameter, approximately 50–90 per cm² in holotype; increase of new corallite lateral. Corallite walls thick, attain 0.24 mm in not adhered corallite, consisting thin epitheca and radially fibrous inner stereoplasm; mural pores approximately 0.2 mm in diameter, closed by pore plate; tabulae thin, complete and nearly horizontal, or incomplete in rare places, dense, but some irregularly spacing, 2–5 in 1 mm; septal spines very short, approximately 0.06 mm in length, abundant, horizontal or slightly upturned, forming longitudinal rows.

Discussion: The well-developed cerioid portions with lacunae of *Eofletcheria adachii* n. sp. clearly distinguished it from all other known species of the genus. In

fragmentary specimen, the distal coralla of *Eofletcheria adachii* are similar to coralla of *E. incerta* (Billings, 1859, figs. 1, 2; Bassler, 1950, pl. 19, figs. 16–18; Sinclair, 1961, pl. 5, figs. 1–3) known from the Middle Ordovician in Laurentia, from which the new species differs in having the strongly flexuous corallites and the denser tabulae.

In a preliminary report, Adachi and Niko (1996) stated that “mural pore lacking in this species”, however some additional thin sections prepared from well-preserved corallites of the holotype show evidence of the above-mentioned emendation (Fig. 2 C).

Etymology: The specific name honors Mr. T. Adachi, who discovered this coral.

Occurrence: Common in the G2 Member at locality 1.

Eofletcheria nipponica n. sp.

(Figs. 4 A–E)

Holotype: NSM PA14287, from which five thin sections were made.

Other specimen: Three thin sections were studied from a single paratype, NSM PA14288.

Diagnosis: Species of *Eofletcheria* with usually phaceloid coralla; diameter of corallites relatively small, approximately 0.7 mm; tabulae strongly concave.

Description: Coralla low-domed to thick turf-like in growth form with maximum observed size 54 mm diameter and 30 mm high, usually phaceloid, but partial adhesion forms small cerioid portions with up to 10 corallites and cateniform portions with up to 4 corallites; each corallite usually cylindrical and circular to subcircular transverse section, or prismatic in rare places, hexagonal to subcircular transverse section in cerioid portions and subcircular to nearly tetragonal transverse section in cateniform portions, relatively small for genus, 0.5–0.9 mm, with mean 0.7 mm in diameter, approximately 70–100 corallites per cm² in holotype; increase of new corallite lateral, overlapped. Corallite walls moderately thick, attain 0.14 mm in not adhered corallite, consisting thin epitheca and inner stereoplasm; mural pore not observed; tabulae thin, complete, strongly concave, relatively dense, 2–3 in 1 mm; septal spine not observed.

Discussion: With the exception of the less developed cerioid portions, *Eofletcheria nipponica* n. sp. differs from *E. adachii* (this report) in its smaller corallite diameter (approximately 0.7 mm vs. approximately 1.0 mm in *E. adachii*) and strongly concave tabulae. *Eofletcheria minima* Lin and Chow (1977, pl. 36, figs. 2 a, b, 3 a, b, 4 a, b, text-figs. 11 a, b) from the Upper Ordovician of South China, *E. shanxiensis* Lin in Li *et al.* (1975, pl. 67, figs. 2 a, b) from the middle Silurian of North China and *E. incerta* are also comparable with this new species. The main differences of these species from *Eofletcheria nipponica* are as follows: *E. minima* has laxly arranged corallites, larger corallite diameter (1.0–1.1 mm), poorly developed

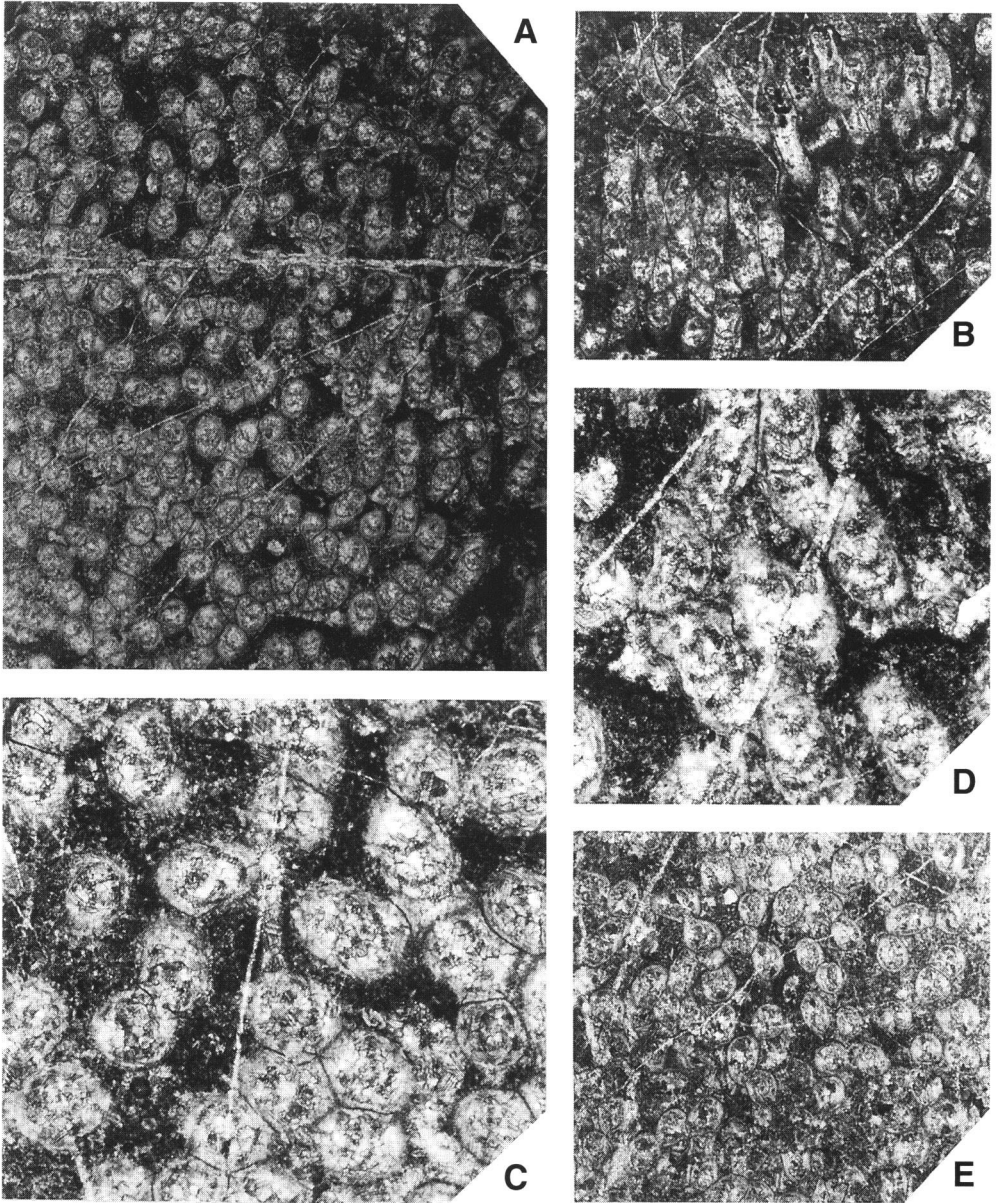


Fig. 4. *Eofletcheria nipponica* n. sp., thin sections. A–D, holotype, NSM PA14287. A, C, transverse sections; B, D, longitudinal sections, note lateral increase and overlapped growth habit in B. E, paratype, NSM PA14288, transverse section. A, B, E = $\times 5$; C, D = $\times 14$.

tabulae, *E. shanxiensis* has frequent increase of new corallites, nearly horizontal tabulae, and *E. incerta* has larger corallite diameter (approximately 1.1 mm).

Etymology: The specific name is derived from Nippon (=Japan).

Occurrence: Scarce in the G3 Member at locality 1 (NSM PA14287) and locality 2 (NSM PA14288).

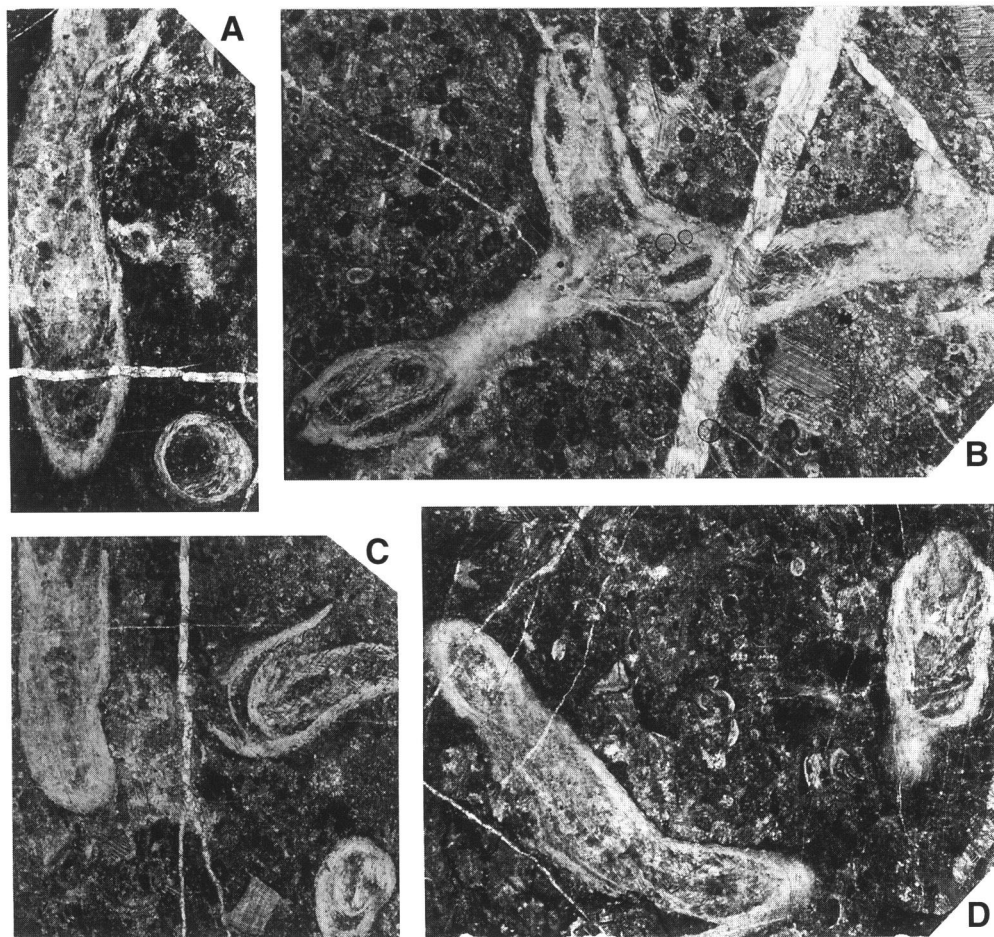


Fig. 5. *Aulocystis* sp. indet., NSM PA14289, thin sections. A, longitudinal section (left) and transverse section (right bottom); B, longitudinal section; C, longitudinal section (left), oblique section (right top) and transverse section (right bottom); D, longitudinal section (left) and oblique section (right). All $\times 10$.

Order Auloporida Sokolov, 1947
 Superfamily Auloporicae Milne-Edwards and Haime, 1851
 Family Aulocystidae Sokolov, 1950
 Genus *Aulocystis* Schlüter, 1885

Type species: *Aulocystis cornigera* Schlüter, 1885.

***Aulocystis* sp. indet.**

(Figs. 5 A–D)

Material: Eight thin sections were studied from the two coralla (NSM PA14289, 14290).

Description: Coralla mat-like in growth form, each corallite consists of proximal prostrate portion, approximately 4 mm in length, and cylindrical distal free portion, at least 6.5 mm in length; cross section of corallites circular, attains 1.6 mm in diameter; daughter corallites of offsets arise near base of free portion; connecting tubule lacking. Corallite walls thick, attain 0.25 mm; tabulae infundibuliform, forming axial syrinx; septal spine and axial tabella not observed.

Discussion: The specimens, though poor preservation, indicate several diagnostic characters of the genus *Aulocystis*: i.e., proximally prostrate and distally free corallites, infundibuliform tabulae with axial syrinx and absence of connecting tubule. This species records the first occurrence of the genus in Japan.

Occurrence: Scarce in the G3 Member at locality 1 (NSM PA14290) and locality 3 (NSM PA14289).

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