A MOLAR OF STEGODON FROM THE PLIOCENE YAME GROUP, WEST JAPAN

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A MOLAR OF *STEGODON* FROM THE PLIOCENE YAME GROUP, WEST JAPAN

By

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Introduction

In 1947 a left upper molar and several fragmental jaws of *Stegodon* were collected by Mr. Hitoshi YAMADA from a lignite bed of Toyo-oka Coal Mine, Nakabaru, Kuroki-machi, Yame-gun, Fukuoka Prefecture, Kyushu. These materials were transferred to the Department of Geology, Kyushu University through Prof. Enzo KONNO. A preliminary report about this elephant was already given by TAKAI and INOUE without illustration under the name of *Stegodon* cf. *bombifrons* (FALCONER and CAUTLEY) (TAKAI and INOUE, 1953). These materials, however, have long been stored in Kyushu University without any more detailed paleontological studies. It is known that *Stegodon bombifrons* (FALCONER and CAUTLEY) occurs in the lower to the middle Pliocene deposits of the Siwalik Hills. Occurrence of this species from the Yame Group seems to be important for the correlation of the Pliocene strata between Japan and continent.

We wish to express our hearty thanks to Prof. Tatsuro MATSUMOTO of Kyushu University for their valuable suggestions and encouragements through the course of this study. We are also greatly indebted to the following persons: Mr. Hitoshi YAMADA for his kind donation of the important materials for study; Prof. Hakuyu OKADA for kindly reading the preliminary draft.

Geologic Setting

Neogene deposits called the Yame Group are distributed in a small area between Kurume City and Yame City and in Kuroki-machi of Yame-gun, Fukuoka Prefecture. This group is overlain unconformably by thick terrestrial deposits and volcanic products of the Pleistocene age. The formations called the Chikugo metamorphic rocks (MATSUMOTO, 1958) are developed as a basement of the late Cenozoic formations in this area.

Stratigraphy of this area has already been published by URATA (1957, 1958). According to his paper, the Yame Group is divided into two formations, the Kuroki

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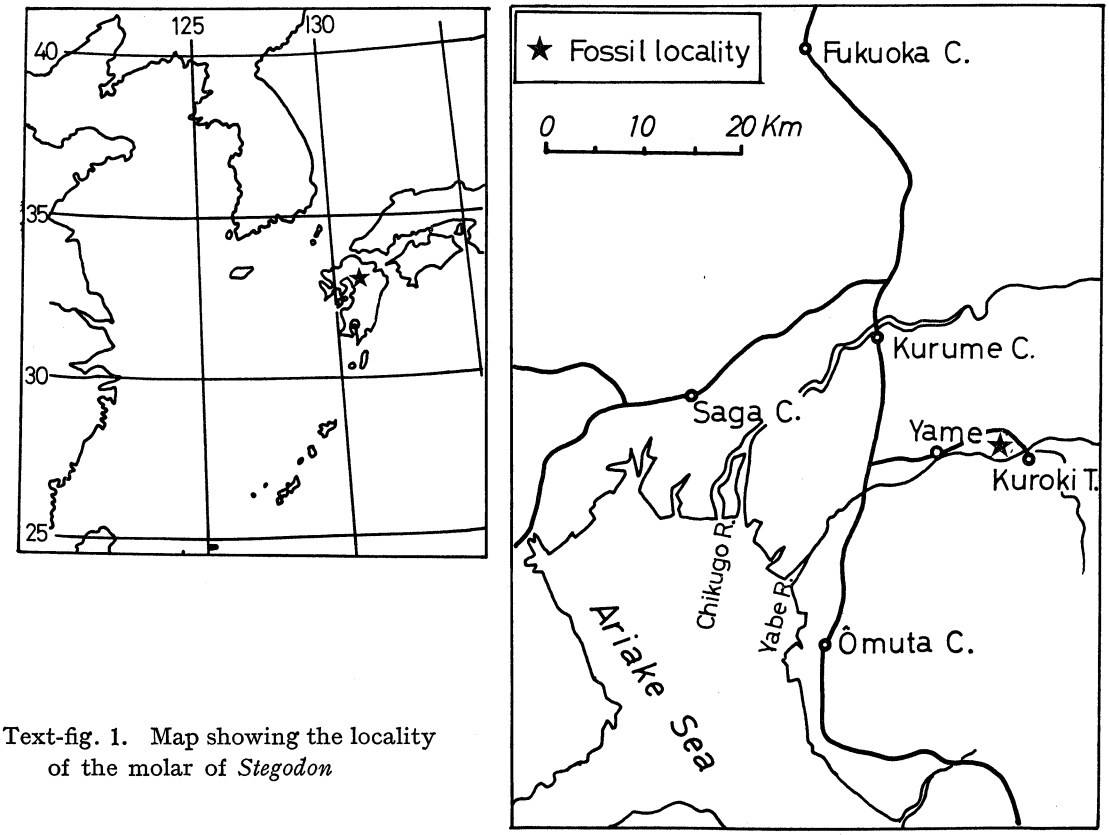
and the Kurume Formations in ascending order. The Kuroki Formation rests on the basement rocks with clino-unconformity. It is mainly distributed in the Kuroki hillocks along the Yabe River of Kuroki-machi and is divided into two members: the Lower Member consists mainly of alternation of gravel and siltstone, while the Upper Member comprises rhyolitic pumiceous tuff and siltstone and is intercalated with lignite beds in the middle part. This formation yields abundant fossil plants which strongly suggest that the formation was deposited under lake environments.

The Kurume Formation is mainly distributed in the southern hillock area of Kurume City. It is about 190 meter thick and is mainly composed of alternation of sand, silt and gravels and occasionally bears thin layers of lignite. Judging from the sedimentary structure and lithofacies, the Kurume Formation is regarded as the sediments deposited in fluvio-deltaic environments. The uppermost part of the Kuroki and the Kurume Formations are unconformably covered with younger deposits called the Kodaraki and the Koyori Gravel Beds, respectively.

A molar of *Stegodon* cf. *bombifrons* (FALCONER and CAUTLEY) was collected from a lignite bed exposed in a pit of Toyo-oka Coal Mine, Nakabaru, Kuroki-machi, Yame-gun, Fukuoka Prefecture. The lignite bed belongs to the Upper Member of the Kuroki Formation of the Yame Group. This formation yields such fossil plants as *Acer* sp., *Euscaphis* sp., *Fagus ferruginea* AITON, *Glyptostrobus pensilis*? KOCH, *Metasequoia disticha*? MIKI, *M. japonica* MIKI, *Sequoia* sp., *Styrax* sp., *Trapa deformata* MIKI, *T. mammillifera* var. *Ikei* KONNO. For the floral assemblage, KONNO (1948) considered that the Kuroki Formation might be of fresh water deposits of the lowermost Pliocene. The stratigraphic subdivision in Kurume and Kuroki areas according to URATA (1958) is as follows:

Table 1. The stratigraphic subdivision in the Kurume and Kuroki areas after URATA (1958).

	Upper Holcene sediments
	..... discordance
	Lower Holocene sediments
	..... discordance
	Upper Pleistocene sediments
	..... discordance
	Lower Pleistocene sediments
	..... discordance
	Kodaraki Conglomerate (Koyori Conglomerate)
	..... discordance
Yame Group	Kurume Formation
	..... discordance
	Kuroki Formation
	..... discordance
	Metamorphic rocks



Text-fig. 1. Map showing the locality of the molar of *Stegodon*

Description of the specimen

Order Proboscidea

Family Stegodontidae YOUNG-HOPWOOD, 1935

Subfamily Stegodontinae OSBORN, 1918

Genus *Stegodon* FALCONER and CAUTLEY, 1846

Type-species.– *Elephas insignis* FALCONER & CAUTLEY, 1846

Stegodon cfr. *bombifrons* (FALCONER and CAUTLEY), 1846

Material.– GKM*1191, a fragmental left upper third molar, stored in the Department of Geology, Faculty of Science, Kyushu University.

Locality.– The lignite bed exposed in a pit of the Toyo-oka Coal Mine, Nakabaru, Kuroki-machi, Yame-gun, Fukuoka Prefecture, Kyushu.

Horizon.– The upper part of the Kuroki Formation, lower part of the Yame Group (middle- to upper Pliocene).

Description of the specimen.– The present specimen is about 125 mm in preserved length and the mesial five ridges are incomplete. Most part of the first ridge and the buccal half of the fifth are broken away, and slight dameges also can be seen on the buccal sides of the second and the fourth and the palatino-cingular parts of the second, third and the anterior accessory cone. The lophs are long, brachyodont and far

* Abbreviation for the Department of Geology, Faculty of Science, Kyushu University

apart each other; two accessory cones can be recognized at the palatinal extremities of the second and the third valleys.

The anterior three ridges are much worn and the posterior two are perforated; eight or more mammillae are observable on the grinding surface of the fourth. The median fissure can be observed on all ridges, of which the second and the third ones are especially strong. As the palatinal side is more incomplete, the buccal side is higher than the other. The enamel layer is as thick as 6 mm on the broken wall and its plication is moderate. The bottom of the valley is filled by a small quantity of cement. All lophs are slightly convex to the grinding surface.

Measurements of 1.M^3 in mm:

	1	2	A1	3	A2	4	5
Breadth	—	95	(25)	105	(24)	106	(75)
Buccal height	—	28	—	33	—	35	35
Palatinal height	—	(22)	(23)	27	(33)	(32)	32
Buccal thickness	—	20	—	25	—	26	—
Palatinal thickness	—	22	18	15	21	13	28

The letter "A" indicates accessory cone. The number in parenthesis is the measurements of incomplete ridge.

Comparison and observation.– The present specimen belongs to a primitive form of the genus *Stegodon* and is distinguishable from several advanced forms, such as *S. orientalis* OWEN, *S. orientalis grangeri* OSBORN and *S. insignis-ganesa* FALCONER and CAUTLEY, etc. by the following characters: 1) comparatively large, broad crown, 2) low, chevron-shaped, less numbered ridge-crests, 3) far-apart lophs, 4) still more visible median cleft, 5) somewhat thick enamel layer, 6) small quantity of cement. On account of its lrge size, the present specimen is clearly discriminated from both *S. sinensis* OWEN and *S. yusheensis* YOUNG. *S. offcinalis* HOPWOOD also differs from it in the ununited conules on the upper molar and less numbered mammillae (4–5) on the ridge-crests.

Many specimens of *Stegodon zdanskyi* HOPWOOD were reported by TEILHARD de CHARDIN and TRASSAERT (1937) from the Middle Zone of the Yushe Series in Shansi Province of China, but we consider that they may be grouped into two characteristic forms, say elongated-form of *Stegodon elephantoides*-type and broad form of *S. bombifrons*-type, as far as descriptions and illustrations given by TEILHARD de CHARDIN et al. (1937) are concerned. As those Chinese specimens are inaccessible, we cannot review at present, we can no longer proceed into further discussions on this problem. Though the specimen is a little smaller than *S. zdanskyi* HOPWOOD in size, it shows a little alliance to latter in its some other characters. *Stegodon elephantoides* (CLIFT) is also distinguished from *S. bombifrons* which has broader crown and less quantity of cement. We can not recognize immediately what relations are present between *S. zdanskyi* of China and *S. bombifrons* of India and do not know the extent of variation of the dental

characters of both species. For the above mentioned reasons and incompleteness of the present specimen, we cannot refer it precisely to *S. bombifrons*, but may at present compare it with the species as one of the most similar one.

We have never heard about any other reliable occurrence of *S. bombifrons* from Japan, excepting a specimen from the Miyazaki Group. Judging from the photograph, a left upper third molar of *Stegodon* sp. yielded from the Uryuno Member of the Tsuma Formation of the Miyazaki Group, Kyushu, may be comparable with the molar of *S. bombifrons*. Unfortunately, however, we cannot examine that specimen because its whereabouts is unknown.

Stegodon bombifrons (FALCONER and CAUTLEY) was first described from the Dhok Pathan Zone (Middle Siwaliks) of the Siwalik Supergroup (FALCONER and CAUTLEY, 1846). This elephant was also discovered from the succeeding Tatrot Zone of the same supergroup. The Dohk Pathan Zone is characterized by the existence of abundant *Hipparion* fauna, while the Tatrot Zone is characterized by the first appearence of *Hippohyus* and *Equus* and the existence of abundant *Hippopotamus* fauna. *Stegodon elephantoides* (CLIFT) was recorded from the Irrawady Series of Burma. According to PILGRIM (1934), the lower part of the Irrawady Series is correlative to the Tatrot Zone of his "Middle Siwalik". He, furthermore, considered the Dhok Patan Zone as the lower Pliocene and the Tatrot as middle Pliocene, while COLBERT (1935) considered both zones as middle- to upper Pliocene age.

In Japan, *Stegodon* cf. *elephantoides* (CLIFT) has hitherto been recorded from the Age Formation of the Tokai Group and its correlatives. KAMEI and SETOGUCHI (1970) called the formation bearing this elephant as the *Stegodon* cf. *elephantoides* Zone according to their proboscidean zonation of the late Neogene of Japan. On the otherhand, SHIKAMA and OTSUKA (1971) called the vertebrate fauna of their *Stegodon* cf. *elephantoides* Zone as the Kameyama Fauna. The present molar specimen from the Kuroki Formation of the Yame Group may be included in this fauna. Furthermore, *Gomphotherium sendaicus* and *Hipparion* (?) sp. have been recorded from the horizon lower than the zone of the Kameyama Fauna and it is called the Ogawa fauna of Pontian age.

The fact that the species of the Kameyama and the Ogawa faunas in Japan are related to those of the Tatrot and the Dhok Pathan Zones indicates that the former two faunas represent a faunal branch so called "Indo-Malayan Faunal Complex" extending from the latter two faunas. Broadly speaking, there may have been an intimate palaeobiogeographic connection between India and Japan. However, such characteristic species as *Hipparion*, *Hippohyus* and *Equus* in the Tatrot and Dohk Pathan Zones have not yet been found in Japan. Therefore, more of the evidence are necessary to explain along what way the fauna migrated.

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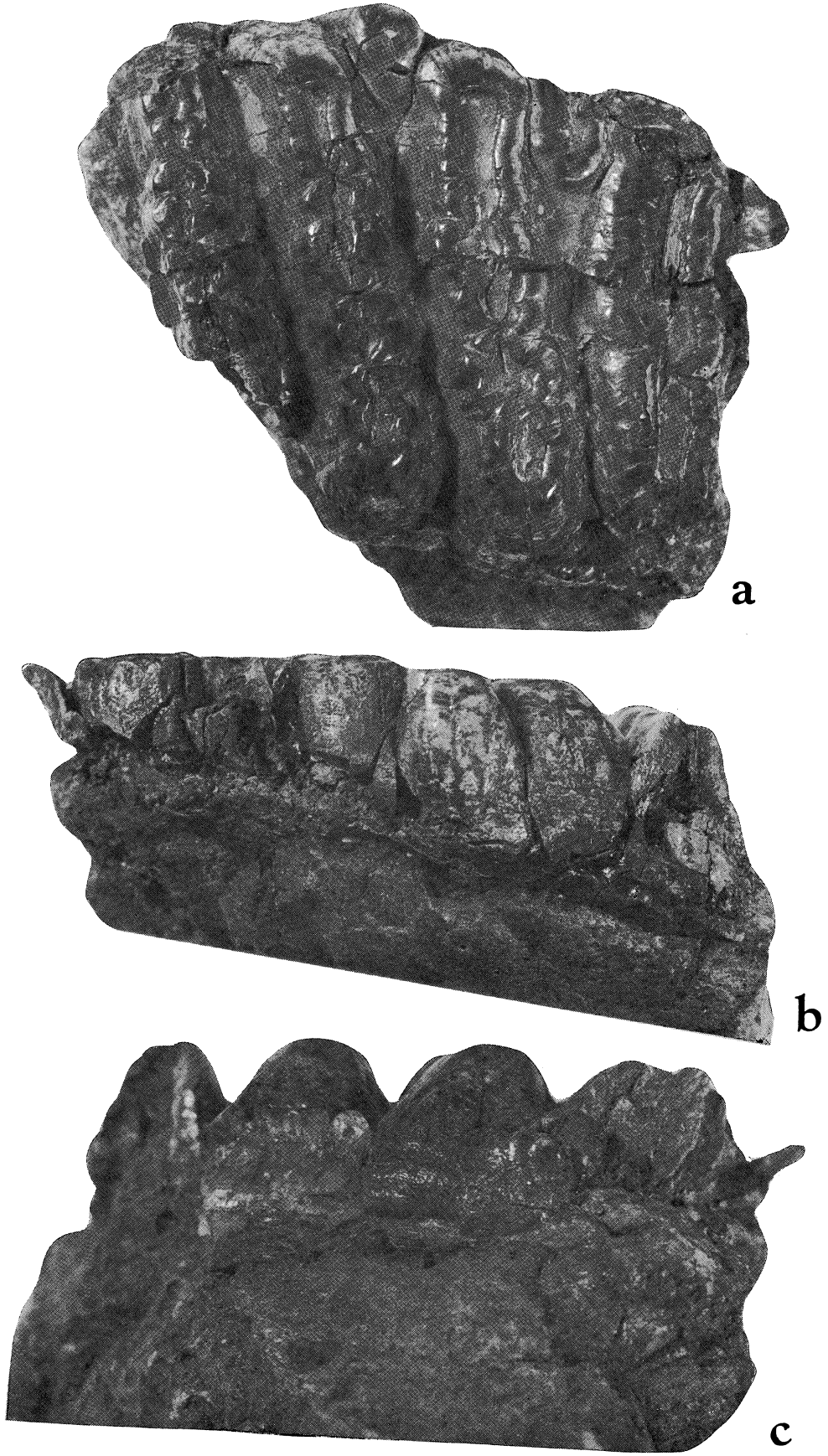
Chikugo	筑後	Kodaraki	上津荒木	Koyori	小 寄
Kuroki	黒木	Kurume	久留米	Nakabaru	中 原
Toyo-oka	豊岡	Tsuma	妻	Uryuno	瓜生野

Explanation of Plate 1

Fig. 1. *Stegodon* cfr. *bombifrons* (Falconer and Cautley) ..... Page 3-5.
Upper left third molar from the Toyo-oka Coal field, Nakabaru of Kuroki-machi, Yame-gun, Fukuoka Prefecture. The stratigraphic horizon of this specimen belongs to the middle part of the Kuroki Formation, the lower part of the Yame Group (middle to upper Pliocene). Crown (a), buccal (b) and palatinal (c) views, ×0.3.


a
b
c