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Lower Cretaceous Marine Pelecypods of Japan Part I

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Itaru HAYAMI

Lower Cretaceous Marine Pelecypods of Japan

Part 1

Plates 27~52

Plate 27

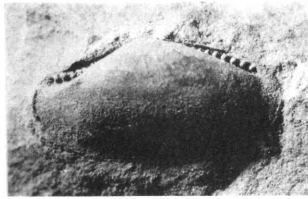
Explanation of Plate 27

- Fig. 1. *Mesosaccella insignis* (NAGAO).....Page 230
 1. Left valve (GK.H6194) ×4. 2nd cycle of the Miyako group at Hn. 4053, Oshima, off the coast of Moshi, Iwazumi town, Iwate Pref. (HAYAMI coll.)
- Fig. 2. *Mesosaccella* sp. indet.Page 233
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- Figs. 3-5. *Malletia* (*Neilo*?) *higoensis* sp. nov.Page 233
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 4. Left internal mould (GK.H6377) ×3. Paratype. Loc. ditto. (KANMERA coll.)
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- Figs. 6, 7. *Parallelodon nipponicus* (NAGAO).....Page 236
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 7. Left internal mould (GK.H6601) ×1.5. Haidateyama formation at U. 1005, between Tamarimizu and Ochiai, Nozu town, Oita Pref. (FUJII and KANMERA coll.)
- Figs. 8-13. *Nanonavis* (*Nanonavis*) *yokoyamai* (YABE and NAGAO).....Page 238
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 8b. Clay cast from the same external mould, ×2.
 9. Left valve (GK.H6605) ×1.75. Oshima formation at Hy. 0004, Shiraitohama, Oshima, Kasenuma City, Miyagi Pref. (AKIYAMA coll.)
 10. Bivalved specimen (GK.H6138) ×1. Yatsushiro formation at Hy. 1016, Miyaji, Yatsushiro City, Kumamoto Pref. (HAYAMI coll.) 10a: Left valve, 10b: right valve.
 11. Right valve (GK.H6139) ×2. Yatsushiro formation at Km. 3037, Miyaji, Yatsushiro City, Kumamoto Pref. (KANMERA coll.)
 12. Left internal mould (GK.H6140) ×1.5. Yatsushiro formation at Km. 3096, south-west of Kohara, Toyo village, Kumamoto Pref. (KANMERA coll.)
 13. Left internal mould (GK.H6200) ×1. Yatsushiro formation at Hy. 1016, Miyaji, Yatsushiro City, Kumamoto Pref. (HAYAMI coll.)
- Fig. 14. *Nanonavis* (*Nanonavis*) sp. cf. *N. (N.) yokoyamai* (YABE and NAGAO) Page 241
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1



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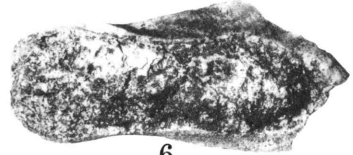
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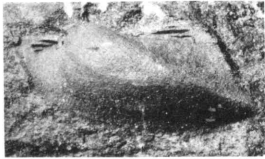
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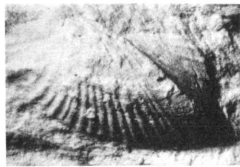
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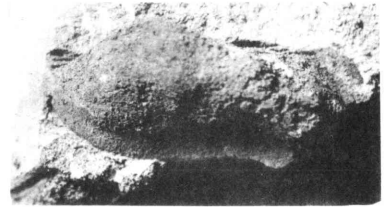
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8a



8b



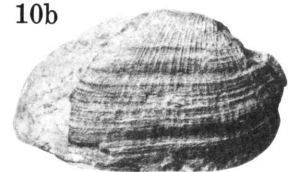
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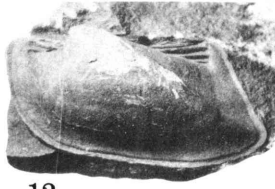
10a



10b



11



12



13



14



15a



15b

Plate 28

Explanation of Plate 28

- Figs. 1-10. *Cucullaea acuticarinata* NAGAO.....Pages 242
1. Left valve (GK.H6380) $\times 1.5$. Hiraiga formation at Hn. 0017, south of Hiraiga, Tanohata village, Iwate Prefecture. (HAYAMI coll.)
 2. Left valve (GK.H6211) $\times 1$. Hiraiga formation at Hn. 0914, Haipe in the same village. (HANAI and HAYAMI coll.)
 3. Left valve (GK.H6381) $\times 1$. Hiraiga formation at Hn. 0017, south of Hiraiga in the same village. (HAYAMI coll.)
 4. Left valve (GK.H6209) $\times 1$. Hiraiga formation at Hn. 0914, Haipe in the same village. (HANAI and HAYAMI coll.)
 5. Right valve (GK.H6206) $\times 1$. Hiraiga formation at Hn. 0017, south of Hiraiga in the same village. (HAYAMI coll.)
 6. Right valve (GK.H6208) $\times 1$. Hiraiga formation at Hn. 0914, Haipe in the same village. (HANAI and HAYAMI coll.)
 7. Right valve (GK.H6205) $\times 1.5$. Hiraiga formation at south of Hiraiga in the same village. (HANAI and HAYAMI coll.)
 - 8a. Right valve (GK.H6207) $\times 1$. Hiraiga formation at Hn. 0914, Haipe in the same village. (HANAI and HAYAMI coll.)
 - 8b. Hinge of the same specimen, $\times 2$.
 9. Right valve (GK.H6210) $\times 1.5$. Hiraiga formation at south of Hiraiga in the same village. (HAYAMI coll.) 9a: side view, 9b: upper view.
 10. Right valve (GK.H6204) $\times 1$. Hiraiga formation at north of Haipe in the same village. (HANAI and HAYAMI coll.)
- Figs. 11-13. *Cucullaea transversa* NAGAOPage 245
11. Left valve (GK.H6212) $\times 1.5$. Hiraiga formation at Hn. 0018, south of Hiraiga, in the same village. (HAYAMI coll.)
 12. Left internal mould (GK.H6213) $\times 1$. Loc. ditto. (HAYAMI coll.)
 13. Left valve (GK.H6214) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
- Figs. 14-15. *Cucullaea fujii* sp. nov.Page 246
14. Internal mould of two valves (GK.H6216) $\times 1.2$. Holotype. Haidateyama formation at U.1005, between Tamarimizu and Ochiai, Nozu town, Oita Pref. (FUJII and KANMERA coll.) 14a: left view, 14b: right view.
 15. Left internal mould (GK.H6217) $\times 1.2$. Paratype. Loc. ditto. (FUJII and KANMERA coll.)
- Fig. 16. *Barbatia* sp. indet.Page 249
16. Left internal mould (GK.H6218) $\times 1.5$. Lower Monobegawa subgroup at Okunominotani, Nangoku City, Kochi Pref. (KIMURA coll.)
- Fig. 17. *Trigonarca* sp. cf. *T. obliquata* AMANOPage 248
17. Right valve (GK.H6146) $\times 1.2$. Yatsushiro formation at south of Bisho, Toyo village, Kumamoto Pref. (AKATSU coll.)

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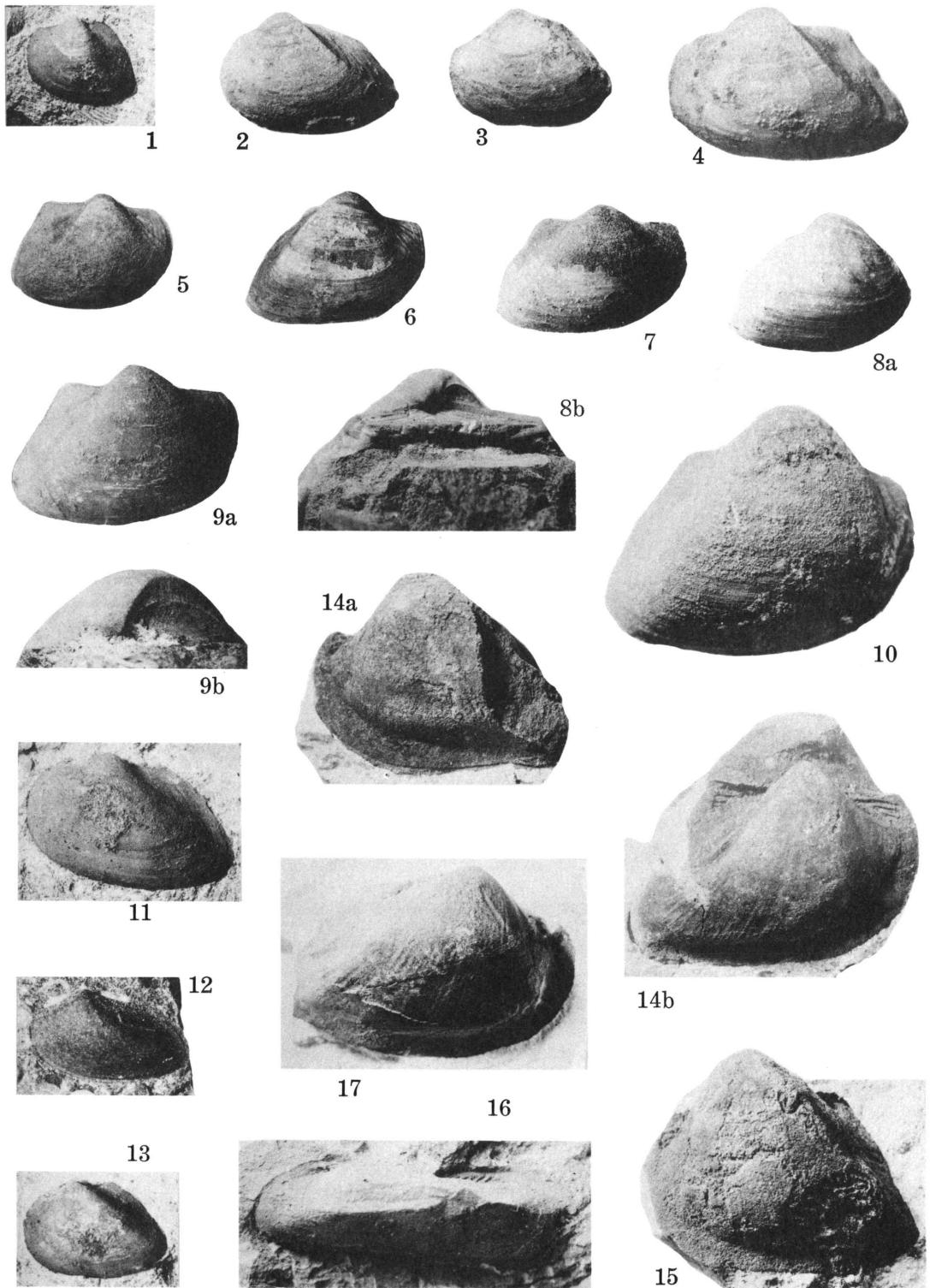
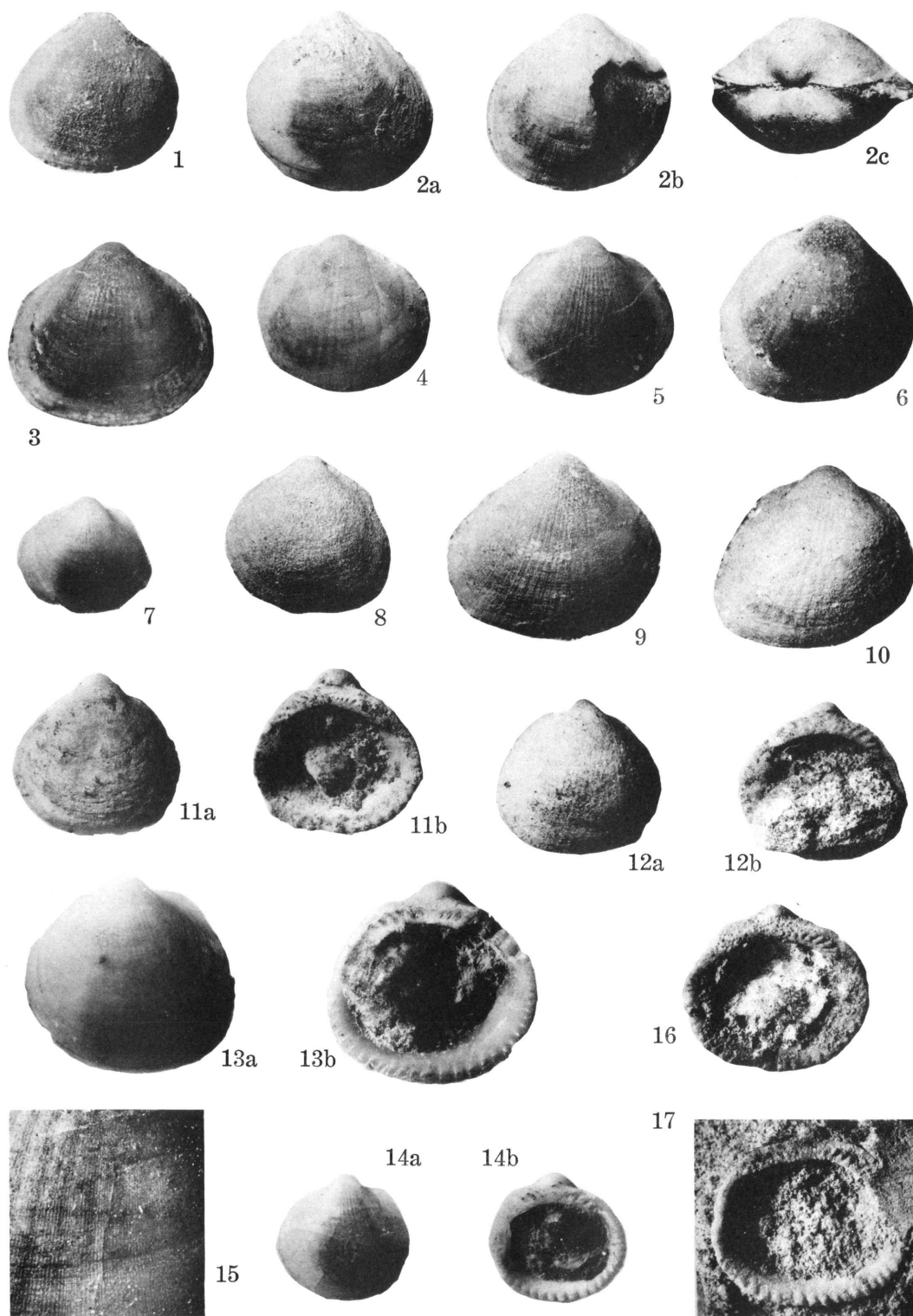


Plate 29

Explanation of Plate 29

- Figs. 1-15. *Glycymeris (Hanaia) densilineata* NAGAOPage 251
1. Right valve (GK.H6357) ×2. Hiraiga formation at Hn.0018, south of Hiraiga Tanohata village, Iwate Pref. (HAYAMI coll.)
 2. Both valves (GK.H6224) ×2. Loc. ditto. (HAYAMI coll.) 2a: left valve, 2b: right valve.
 3. Right valve (GK.H6221) ×2. Hiraiga formation at Hn.0017, south of Hiraiga in the same village. (HAYAMI coll.)
 4. Right valve (GK.H6354) ×1.5. Loc. ditto. (HAYAMI coll.)
 5. Right valve (GK.H6222) ×2. Loc. ditto. (HAYAMI coll.)
 6. Right valve (GK.H6223) ×2. Hiraiga formation at Haipe in the same village. (HANAI and HAYAMI coll.)
 7. Left valve (GK.H6353) ×2. Hiraiga formation at Hn.0017, south of Hiraiga in the same village. (HAYAMI coll.)
 8. Left valve (GK.H6355) ×2. Hiraiga formation at Hn.0018, south of Hiraiga in the same village. (HAYAMI coll.)
 9. Right valve (GK.H6352) ×2. Loc. ditto. (HAYAMI coll.)
 10. Right valve (GK.H6356) ×2. Loc. ditto. (HAYAMI coll.)
 11. Left valve (GK.H6219) ×2. Hiraiga formation at Haipe in the same village. (HANAI coll.) 11a: exterior, 11b: interior.
 12. Right valve (GK.H6220) ×2. Loc. ditto. (HANAI coll.) 12a: exterior, 12b: interior.
 13. Left valve (GK.H6225) ×2. Hiraiga formation at Hn.0017, south of Hiraiga in the same village. (HAYAMI coll.) 13a: exterior, 13b: interior.
 14. Left valve (GK.H6351) ×2. Loc. ditto. (HAYAMI coll.) 14a: exterior; 14b: interior.
 15. Surface ornament of the same specimen as Fig. 9, ×5.
- Figs. 16, 17. *Glycymeris (Glycymerita?) haipensis* sp. nov.Page 254
16. Left valve (GK.H6226) ×1.5. Holotype. Hiraiga formation at Hn.0914, Haipe, Tanohata village, Iwate Prefecture (HAYAMI coll.)
 17. Right? valve (GK.H6227) ×1.5. Paratype. 2nd cycle of the Miyako group at Hn.4051, Oshima, off the coast of Moshi, Iwaizumi town, Iwate Pref. (HAYAMI coll.)

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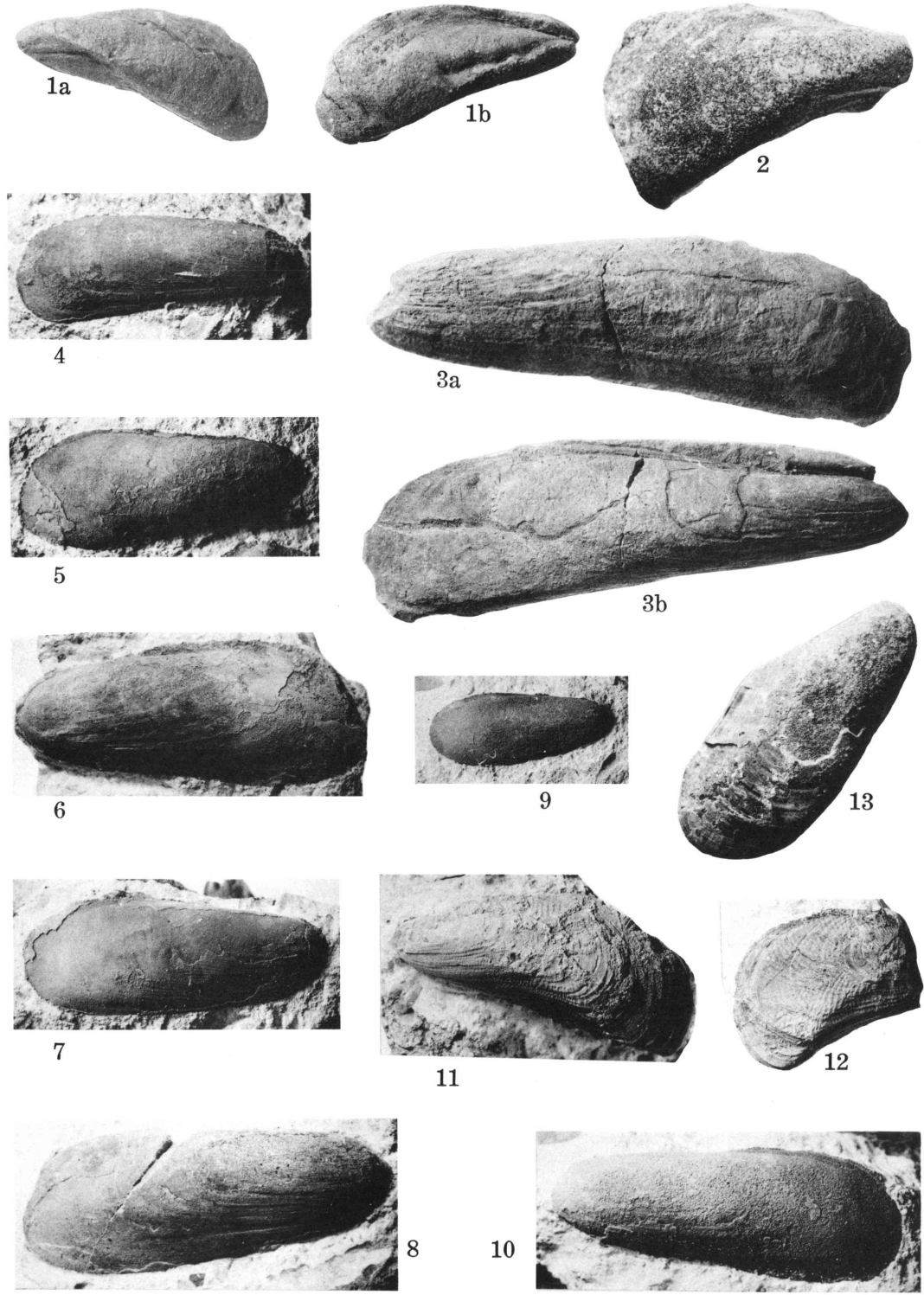
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Plate 30

Explanation of Plate 30

- Figs. 1, 2. *Modiolus falcatus* AMANOPage 255
1. Internal mould of both valves (GK.H6589) $\times 2$. Arita formation at Ys.103, west of Kumai, Yuasa town, Wakayama Pref. (MATSUMOTO et al. coll.) 1a: left view, 1b: right view.
 2. Right internal mould (GK.H6228) $\times 2$. Tanohata formation at Hn. 0220, north of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)
- Fig. 3. *Modiolus* sp. aff. *M. subsimplex* D'ORBIGNYPage 256
3. Internal mould of both valves (GK.H6588) $\times 1$. Arita formation at Ys.103, west of Kumai, Yuasa town, Wakayama Pref. (MATSUMOTO et al. coll.) 3a: left view; 3b: right view.
- Figs. 4-10. *Amygdalum ishidoense* (YABE and NAGAO)Page 257
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 5. Right valve (GK.H6359) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
 6. Left valve (GK.H6232) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
 7. Right valve (GK.H6229) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
 8. Right valve (GK.H6230) $\times 1.5$. Hiraiga formation at Hn. 0017, south of Hiraiga, the same village. (HANAI and HAYAMI coll.)
 9. Right valve (GK.H6360) $\times 1.5$. Hiraiga formation at Hn. 0018, south of Hiraiga, the same village. (HANAI and HAYAMI coll.)
 10. Left internal mould (GK.H6231) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
- Figs. 11, 12. *Lecompteus* sp. cf. *L. guerangeri* (D'ORBIGNY)Page 259
11. Left valve (GK.H6233) $\times 1.5$. 2nd cycle of the Miyako group at Hn. 4053, Oshima, off the coast of Moshi, Iwaizumi town, Iwate Pref. (HAYAMI coll.)
 12. Right valve (GK.H6234) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
- Fig. 13. *Mytilus?* sp. indet.Page 260
13. Right valve (GK.H6624) $\times 1.5$. Loc. ditto. (HAYAMI coll.)

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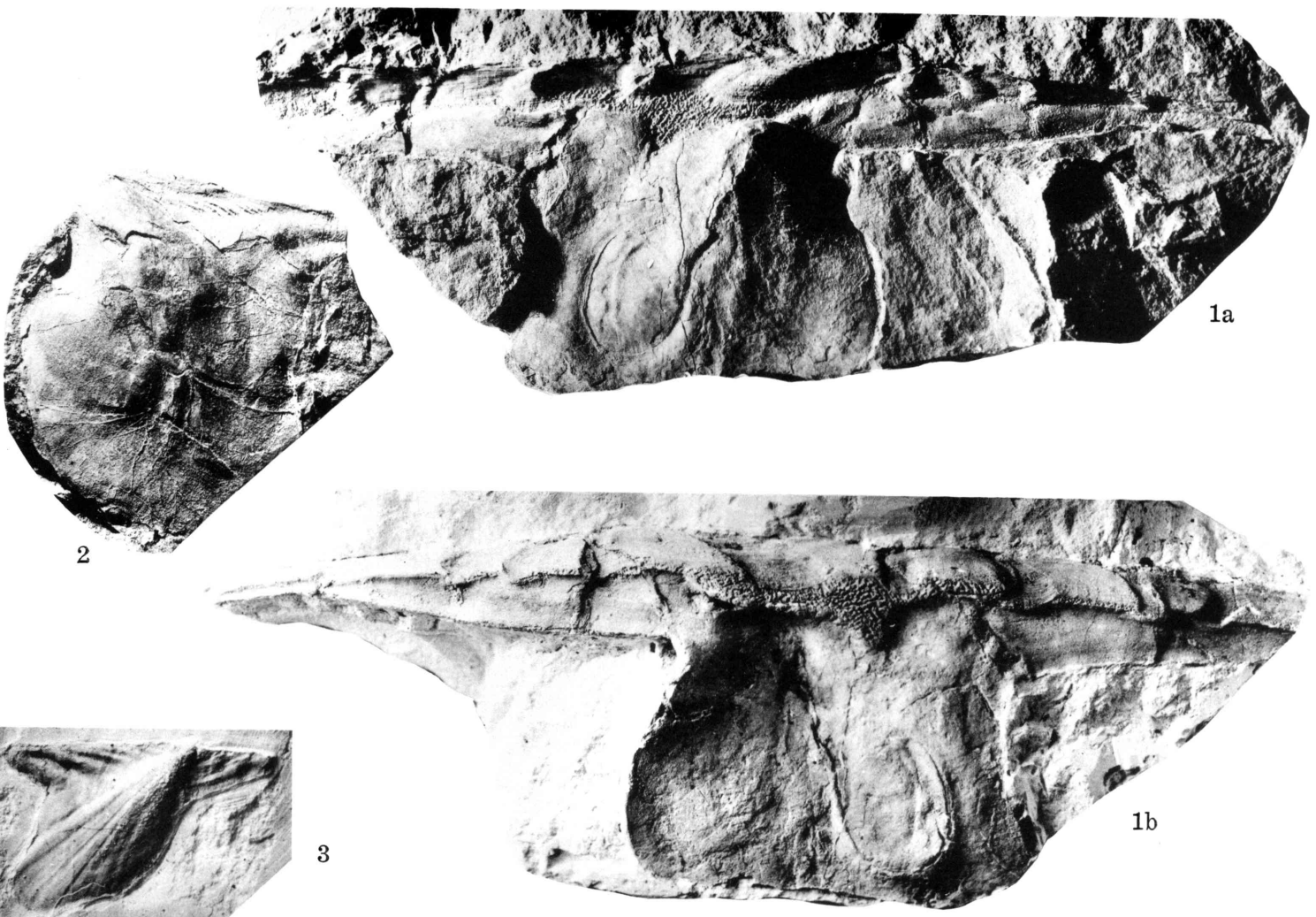
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Plate 31

Explanation of Plate 31

- Figs. 1-3. *Pterinella shinoharai* sp. nov.Page 265
- 1a. Right internal mould (GK.H6235) $\times 0.75$. Holotype. Yatsushiro formation at Hy.1012, Nekodani, Yatsushiro City, Kumamoto Pref. (AMANO coll.)
 - 1b. Plaster cast from the same specimen, $\times 0.75$.
 2. Left internal mould (GK.H6149) $\times 1$. Paratype. Yatsushiro formation at Km. 1843, Shimofukami, Sakamoto town, Kumamoto Pref. (KANMERA coll.)
 3. Plaster cast from a right external mould (GK.H6616) $\times 1.5$. Paratype. Hanoura formation at Hy.5002, Hiroyasu, Katsuura town, Tokushima Pref. (HAYAMI coll.)

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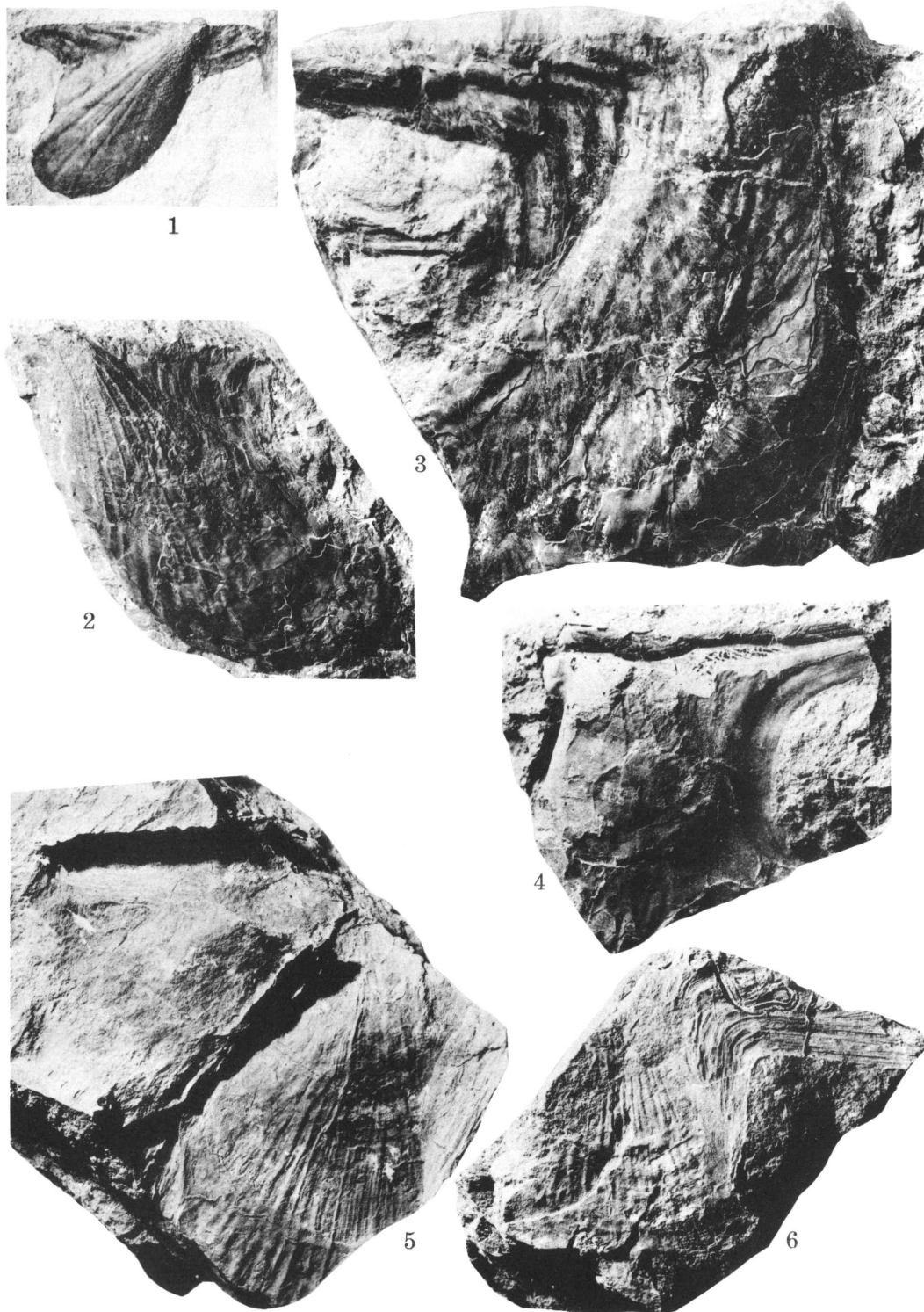
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Plate 32

Explanation of Plate 32

- Figs. 1-6. *Pterinella shinoharai* sp. nov.Page 265
1. Right internal mould (GK.H6616) $\times 1.5$. Paratype. Hanoura formation at Hy. 5002, Hiroyasu, Katsuura town, Tokushima Pref. (HAYAMI coll.)
 2. Left valve (GK.H6614) $\times 1$. Paratype. Hanoura formation at Hiroyasu (exactly unknown), the same town. (HAYAMI coll.)
 3. Right valve (GK.H6615) $\times 1$. Paratype. Loc. ditto. (HAYAMI coll.)
 4. Left internal mould (GK.H6613) $\times 1$. Paratype. Loc. ditto. (HAYAMI coll.)
 5. Right external mould (GK.H6362) $\times 1$. Paratype. Hanoura formation at Hy. 5002, Hiroyasu, Katsuura town, Tokushima Pref. (HAMADA coll.)
 6. Right external mould (GK.H6151) $\times 0.5$. Paratype. Yatsushiro formation at Km. 1843, Shimofukami, Sakamoto town, Kumamoto Pref. (KANMERA coll.)

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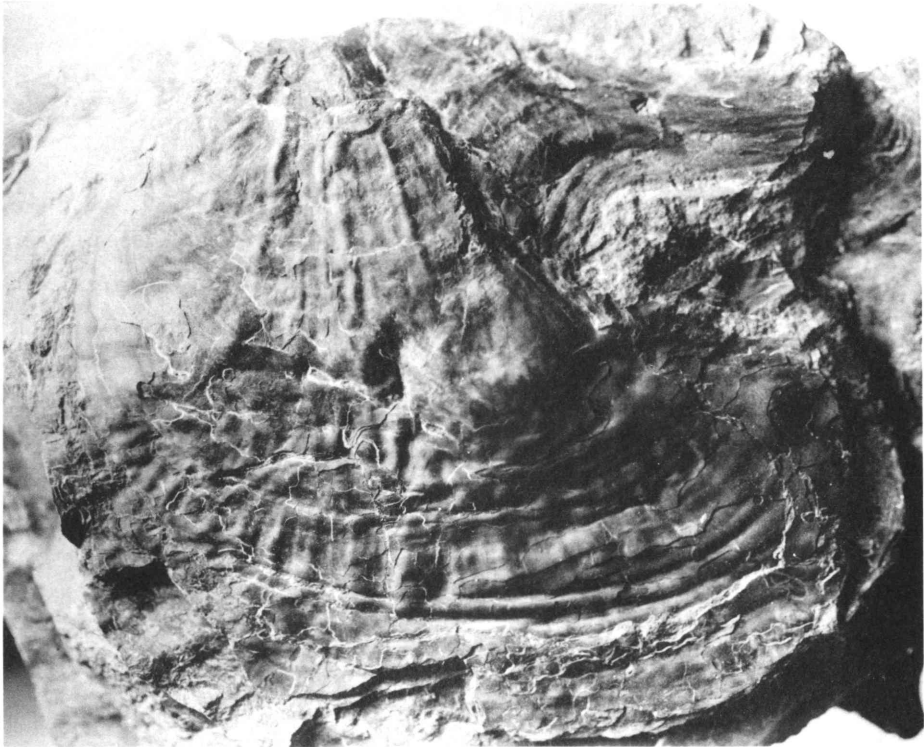
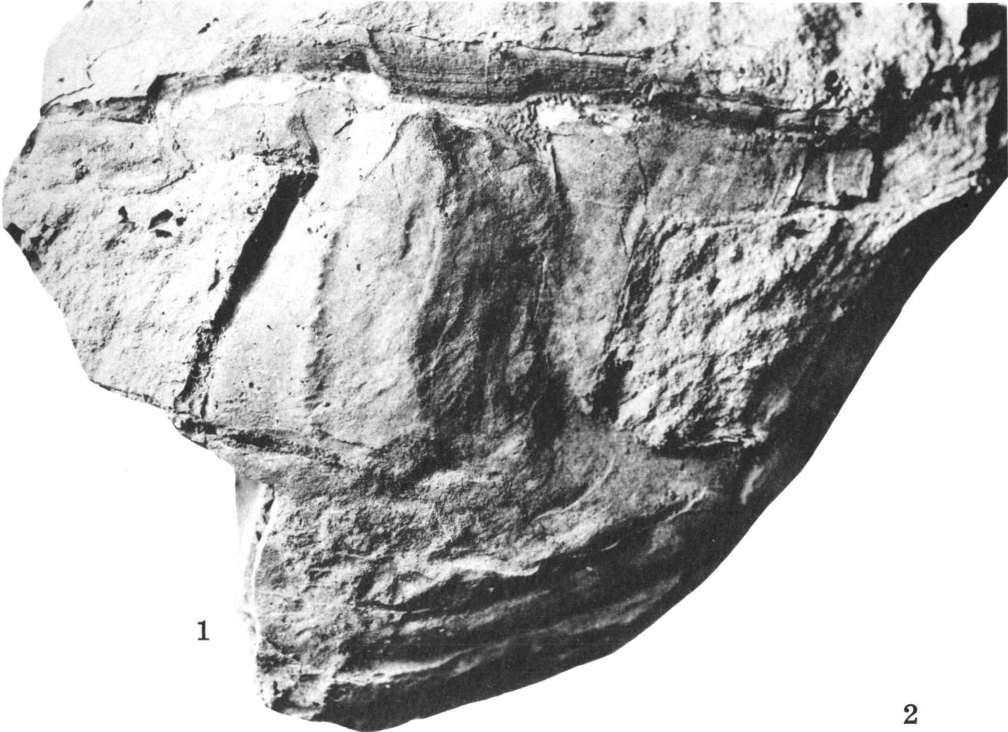
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Plate 33

Explanation of Plate 33

- Figs. 1, 2. *Pterinella shinoharai* sp. nov.Page 265
1. Left internal mould (GK.H6609) ×1. Paratype. Hanoura formation at Hiroyasu (exactly unknown), Katsuura town, Tokushima Pref. (HAYAMI coll.)
 2. Left valve (GK.H6611) ×1. Paratype. Loc. ditto. (HAYAMI coll.)

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Plate 34

Explanation of Plate 34

- Figs. 1, 2. *Pterinella shinoharai* sp. nov.Page 265
1. Hinge area of the same plaster cast as in pl. 31, fig. 1b, $\times 2$.
 2. Right external mould (GK.H6612) $\times 1$. Paratype. Hanoura formation at Hiroyasu (exactly unknown), Katsuura town, Tokushima Pref. (HAYAMI coll.)

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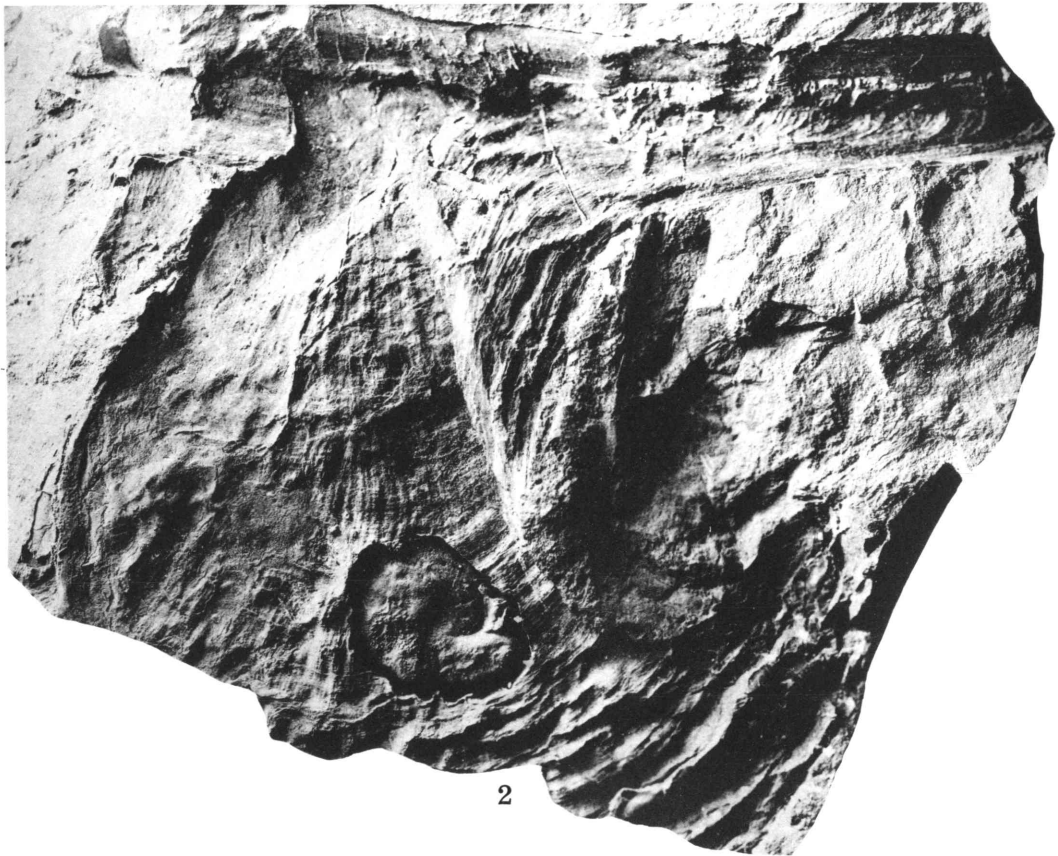
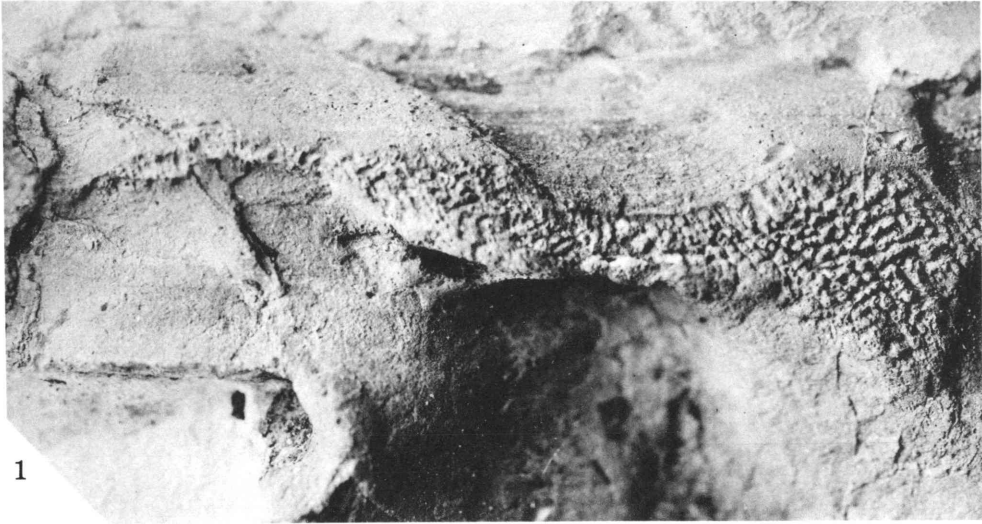
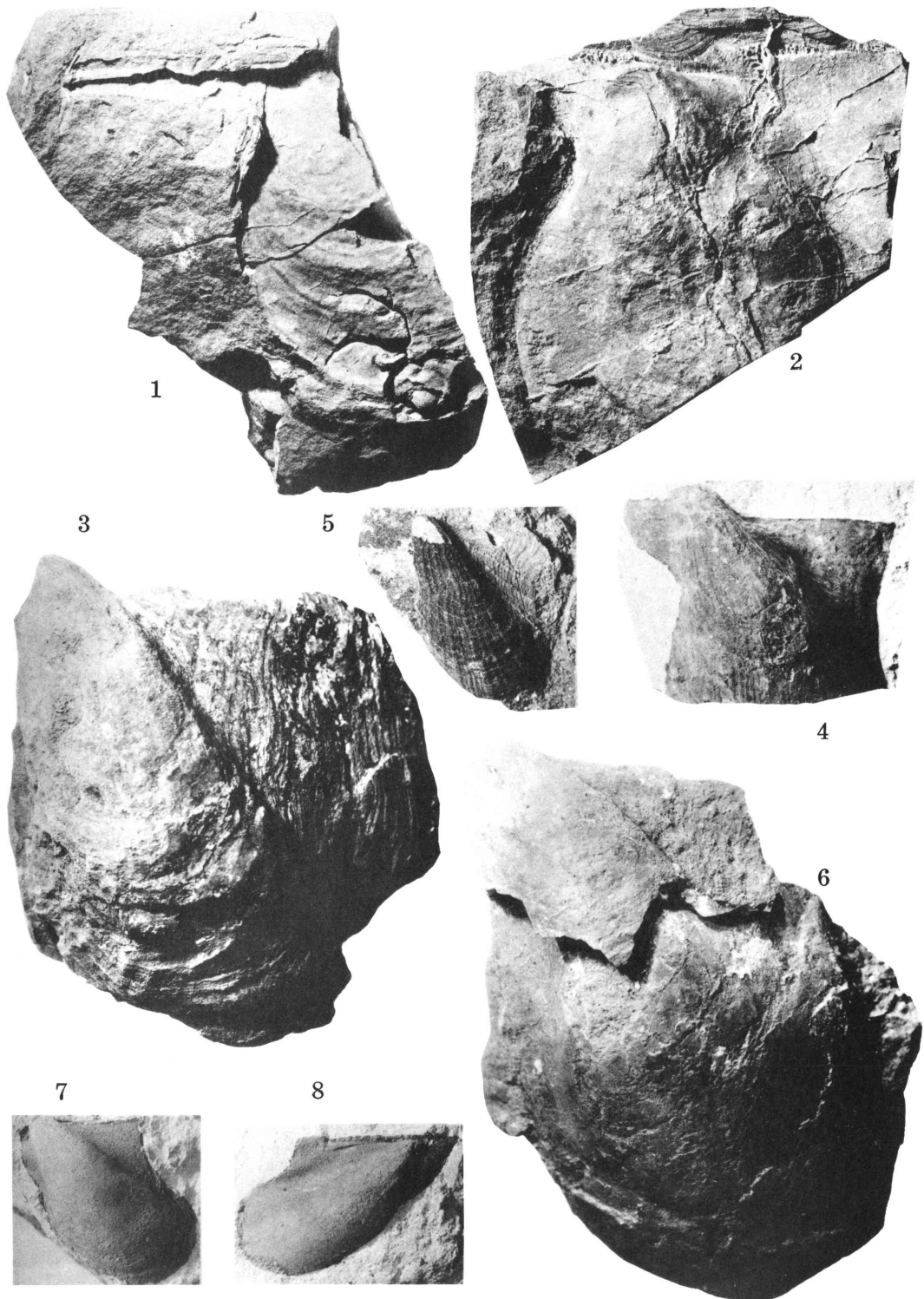


Plate 35

Explanation of Plate 35

- Figs. 1, 2. *Pterinella shinoharai* sp. nov.Page 265
1. Right external mould (GK.H6148) $\times 0.5$. Paratype. Yatsushiro formation at Km. 1843, Shimofukami, Sakamoto town, Kumamoto Pref. (KANMERA coll.)
 2. Left internal mould (GK.H6150) $\times 1$. Paratype. Loc. ditto. (KANMERA coll.)
- Figs. 3-6. *Gervillaria haradae* (YOKOYAMA).....Page 269
3. Left valve (GK.H6236) $\times 1$. Yatsushiro formation at Hy. 1021, south of Bisho, Toyo village, Kumamoto Pref. (HAYAMI coll.)
 4. Left valve (GK.H6625) $\times 1$. Ishido formation at Hy. 4001, south of Kagahara, Nakazato village, Gumma Pref. (ICHIKAWA and HAYAMI coll.)
 5. Left valve (GK.H6237) $\times 1.5$. Hiraiga formation at Hn. 0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)
 6. Left valve (GK.H6626) $\times 1$. Loc. ditto. (HAYAMI coll.)
- Figs. 7, 8. *Bakevellia iwatensis* sp. nov.Page 275
7. Left internal mould (GK.H6251) $\times 1.5$. Paratype. Hiraiga formation at Hn. 0018, south of Hiraiga, Tanohata village, Iwate Pref. (HANAI and HAYAMI coll.)
 8. Right internal mould (GK.H6249) $\times 1.5$. Holotype. Loc. ditto. (HANAI and HAYAMI coll.)

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Plate 36

Explanation of Plate 36

- Fig. 1. *Gervillaria haradae* (YOKOYAMA)Page 269
1. Left valve (GK.H6154) $\times 0.8$. Yatsushiro formation at At. 828A, south of Bisho, Toyo village, Kumamoto Pref. (AKATSU coll.)
- Figs. 2-4. *Gervillaria miyakoensis* (NAGAO).....Page 271
2. Left valve (GK.H6238) $\times 1$. Hiraiga formation at Hn. 0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.) 2a: exterior, 2b: interior.
 3. Left valve (GK.H6241) $\times 0.9$. "*Orbitolina* sandstone" of the Miyako group at Hn. 6203, northeast of Raga, the same village. (HANAI and HAYAMI coll.)
 4. Left internal mould (GK.H6242) $\times 1$. Hiraiga formation at south of Hiraiga, the same village. (HAYAMI coll.)

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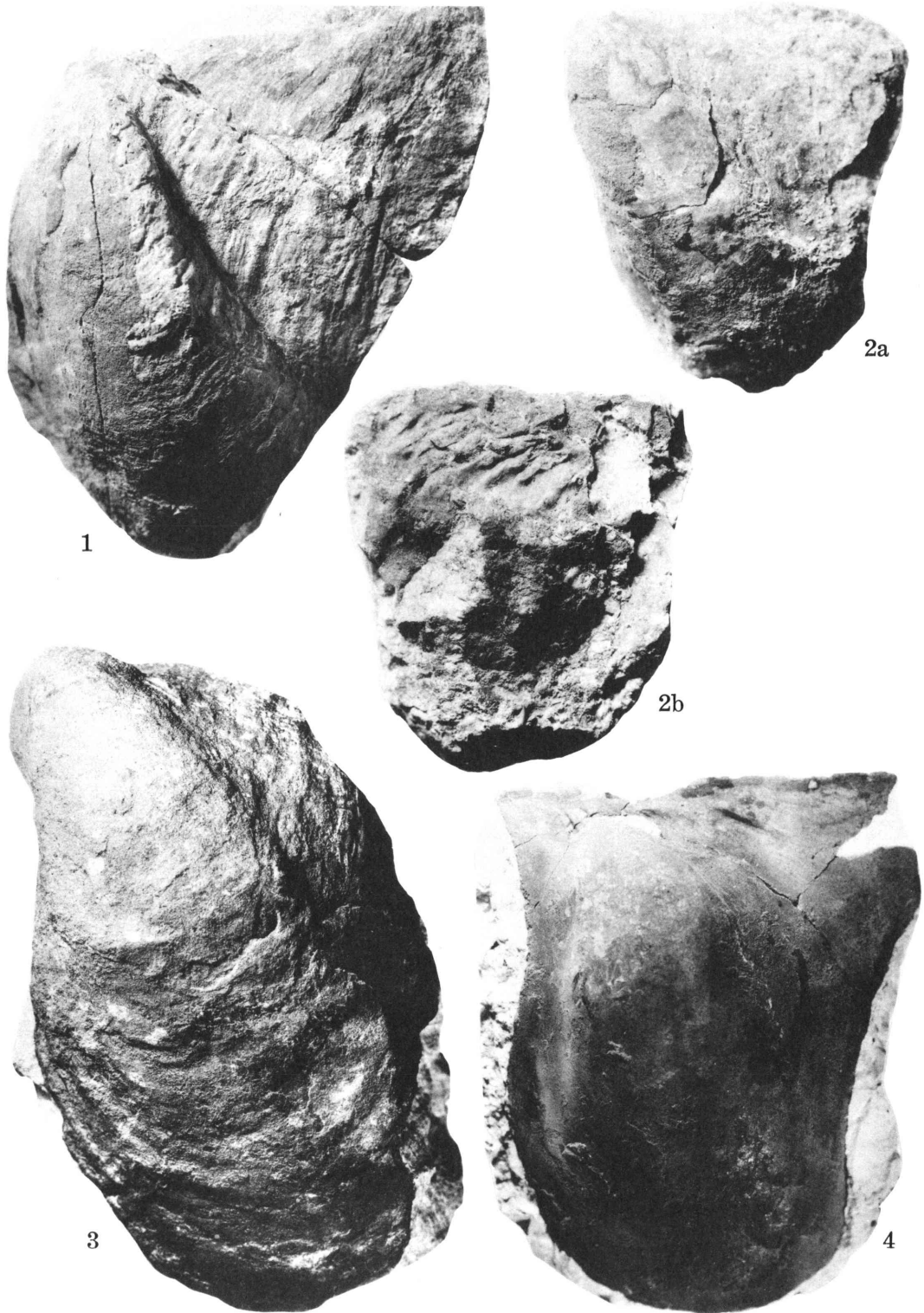
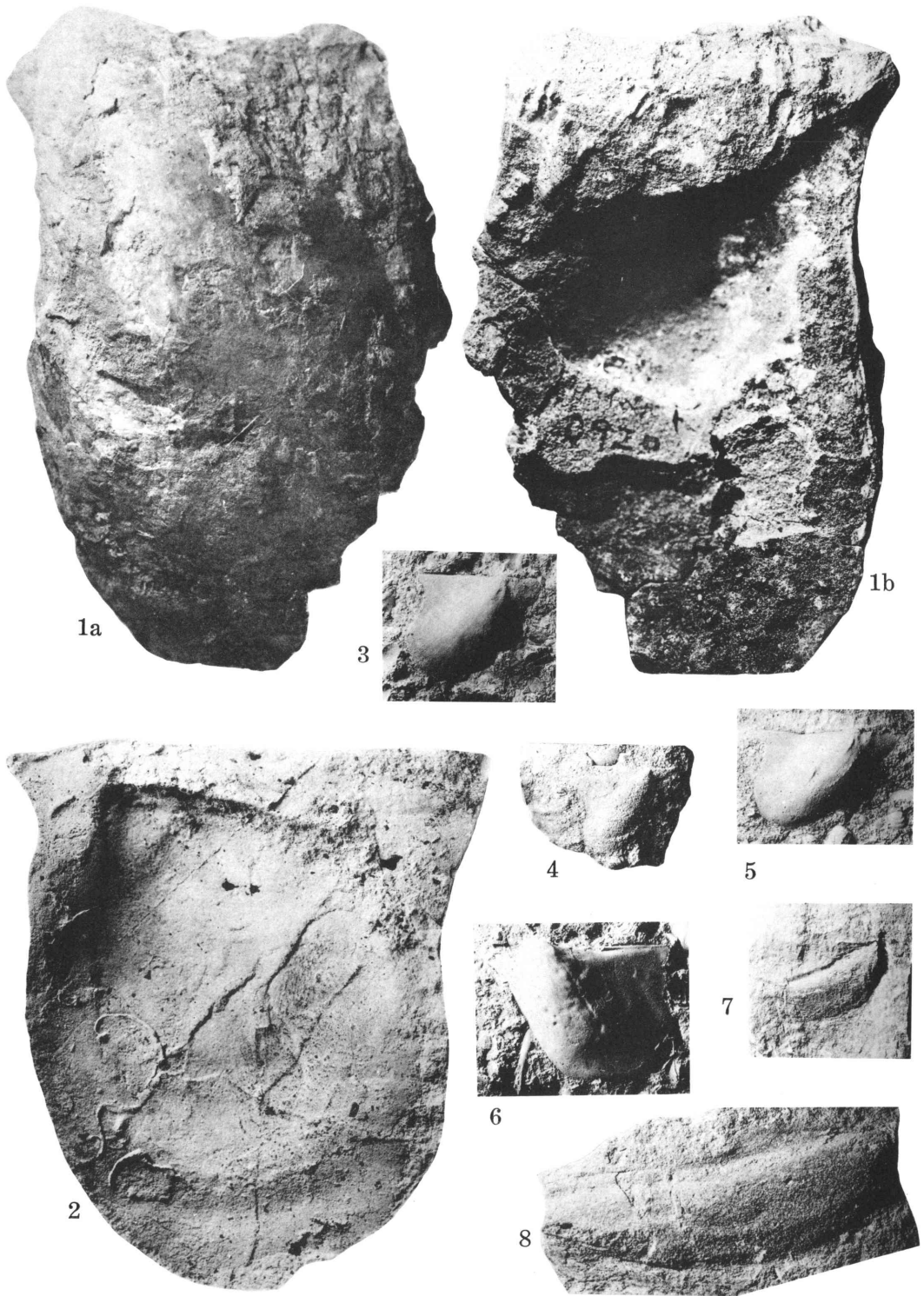


Plate 37

Explanation of Plate 37

- Fig. 1. *Gervillaria miyakoensis* (NAGAO)Page 271
1. Left valve (GK.H6239) $\times 0.9$. Hiraiga formation at Hn. 0920, Haibe, Tanohata village, Iwate Pref. (HANAI and HAYAMI coll.) 1a: exterior, 1b: interior.
- Fig. 2. *Gervillaria haradae* (YOKOYAMA)Page 269
2. Plaster cast from a right internal mould (GK.H6630) $\times 1$. Ishido formation at Hy. 4001, south of Kagahara, Nakazato village, Gumma Pref. (ICHIKAWA and HAYAMI coll.)
- Figs. 3-6. *Bakevellia pseudorostrata* (NAGAO)Page 273
3. Right internal mould (GK.H6246) $\times 1.5$. Hiraiga formation at Hn. 0018, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)
4. Right valve (GK.H6247) $\times 1.5$. Hiraiga formation at Hn. 0017, south of Hiraiga, the same village (HANAI and HAYAMI coll.)
5. Right internal mould (GK.H6245) $\times 1.5$. Hiraiga formation at Hn. 0018, south of Hiraiga, the same village. (HAYAMI coll.)
6. Left internal mould (GK.H6243) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
- Figs. 7, 8. *Gervillia* (*Gervillia*) *forbesiana* D'ORBIGNYPage 276
7. Right internal mould (GK.H6162) $\times 1$. Yatsushiro formation at Km. 3096, south-west of Kohara, Toyo village, Kumamoto Pref. (KANMERA coll.)
8. Right internal mould (GK.H6161) $\times 1$. Yatsushiro formation at Km. 1843, north of Shimofukami, Sakamoto town, Kumamoto Pref. (KANMERA coll.)

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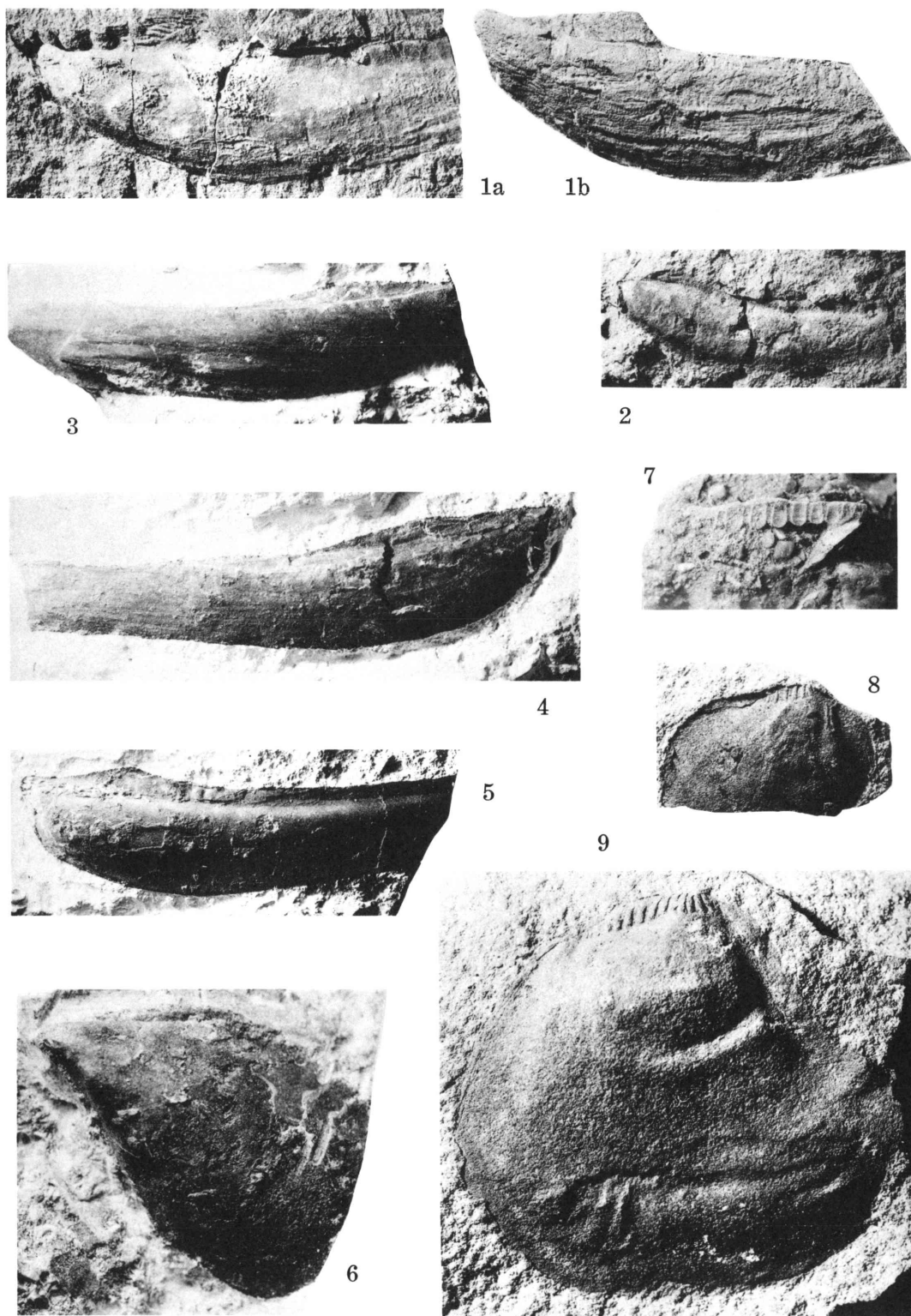
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Plate 38

Explanation of Plate 38

- Figs. 1-5. *Gervillia* (*Gervillia*) *forbesiana* D'ORBIGNYPage 276
- 1a. Left internal mould (GK.H6163) $\times 1$. Yatsushiro formation at At. 828A, south of Bisho, Toyo village, Kumamoto Pref. (AKATSU coll.)
 - 1b. Plaster cast from the same external mould, $\times 1$.
 2. Left internal mould (GK.H6164) $\times 1$. Yatsushiro formation at Km. 1843, north of Shimofukami, Sakamoto town, Kumamoto Pref. (KANMERA coll.)
 3. Right valve (GK.H6252) $\times 1$. Hiraiga formation at Hn. 0018, south of Hiraiga, Tanohata village, Iwate Pref. (HANAI and HAYAMI coll.)
 4. Right valve (GK.H6253) $\times 1$. Loc. ditto. (HAYAMI coll.)
 5. Left internal mould (GK.H6254) $\times 1$. Loc. ditto. (HAYAMI coll.)
- Figs. 6, 7. *Isognomon* (*Mytiloperna*) sp.Page 280
6. Left internal mould (GK.H6606) $\times 1.5$. Hiraiga formation at Hn. 0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)
 7. Left valve (GK.H6256) $\times 1.5$. Tanohata formation at Hn. 0803, Koikorobe, the same village. (HAYAMI coll.)
- Figs. 8, 9. *Isognomon* (*Melina*) *ichikawai* sp. nov.Page 280
8. Right internal mould (GK.H6258) $\times 1.5$. Paratype. Ishido formation at Hy. 4011, Ishido, Ohinata village, Nagano Pref. (HAYAMI coll.)
 9. Right internal mould (GK.H6257) $\times 1.5$. Holotype. Loc. ditto. (HAYAMI coll.)

All specimens illustrated are kept in the Department of Geology, Kyushu University.



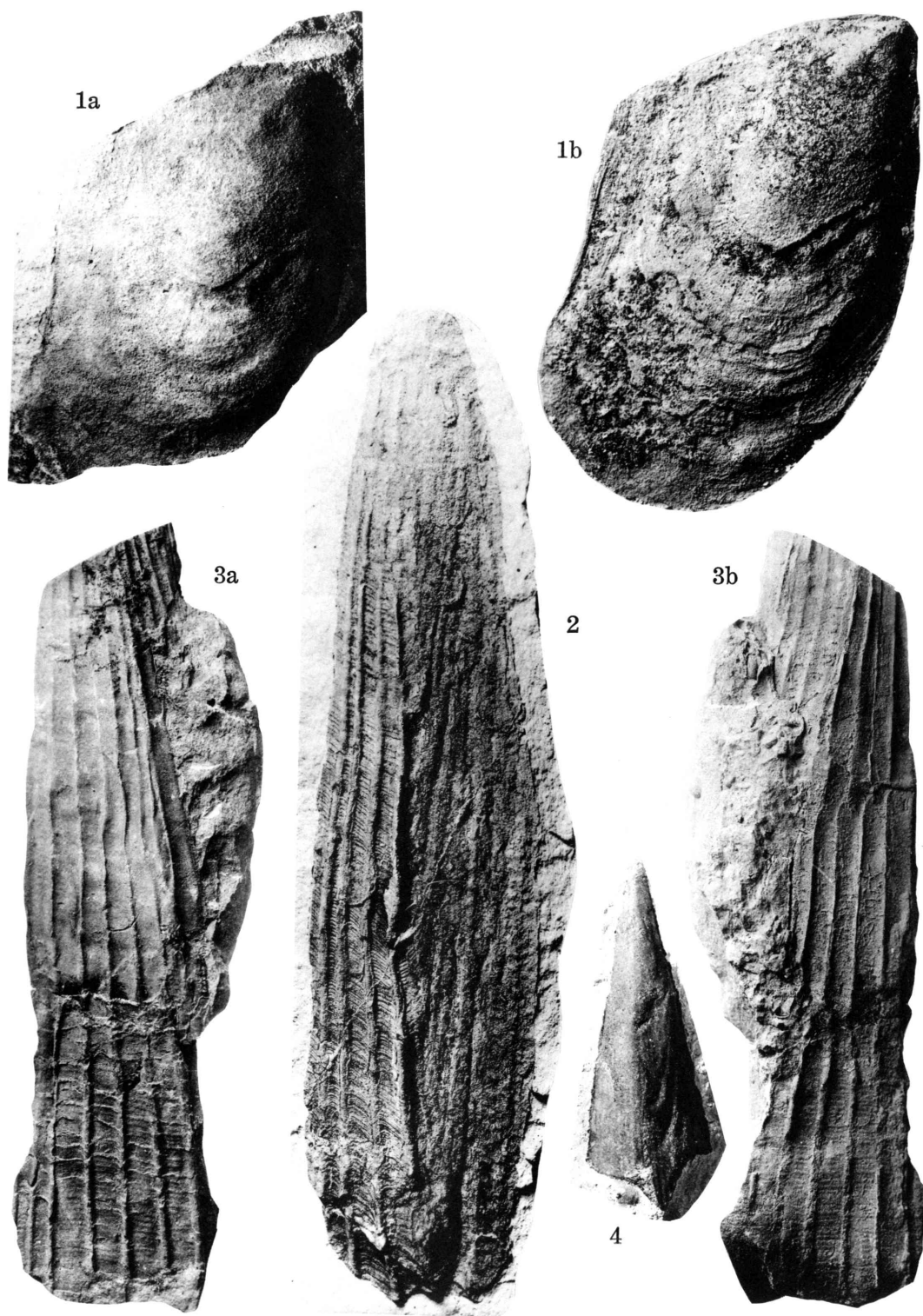
I. HAYAMI: Lower Cretaceous marine Pelecypods of Japan

Plate 39

Explanation of Plate 39

- Fig. 1. *Isognomon* (*Isognomon*) *choshiensis* sp. nov.Page 279
- 1a. Right internal mould (GK.H6255) $\times 1$. Holotype. Choshi formation at Ashikajima, Choshi City, Chiba Pref. (HANAI coll.)
 - 1b. Plaster cast from the same external mould, $\times 1$.
- Figs. 2, 3. *Pinna* sp. cf. *P. robinaldina* D'ORBIGNYPage 281
2. Plaster cast from a right external mould (GK.H6261) $\times 0.9$. Ishido formation at Hy. 4011, Ishido, Ohinata village, Nagano Pref. (ICHIKAWA coll.)
 3. Internal mould of a bivalved specimen (GK.H6607) $\times 1$. Hinagu formation at Km. 1832, Tsuzura, Sakamoto town, Kumamoto Pref. (KANMERA coll.) 3a: right view, 3b: left view.
- Fig. 4. *Pinna* sp. indet.Page 282
4. Right valve (GK.H6260) $\times 1.5$. Hiraiga formation at Hn. 0018, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)

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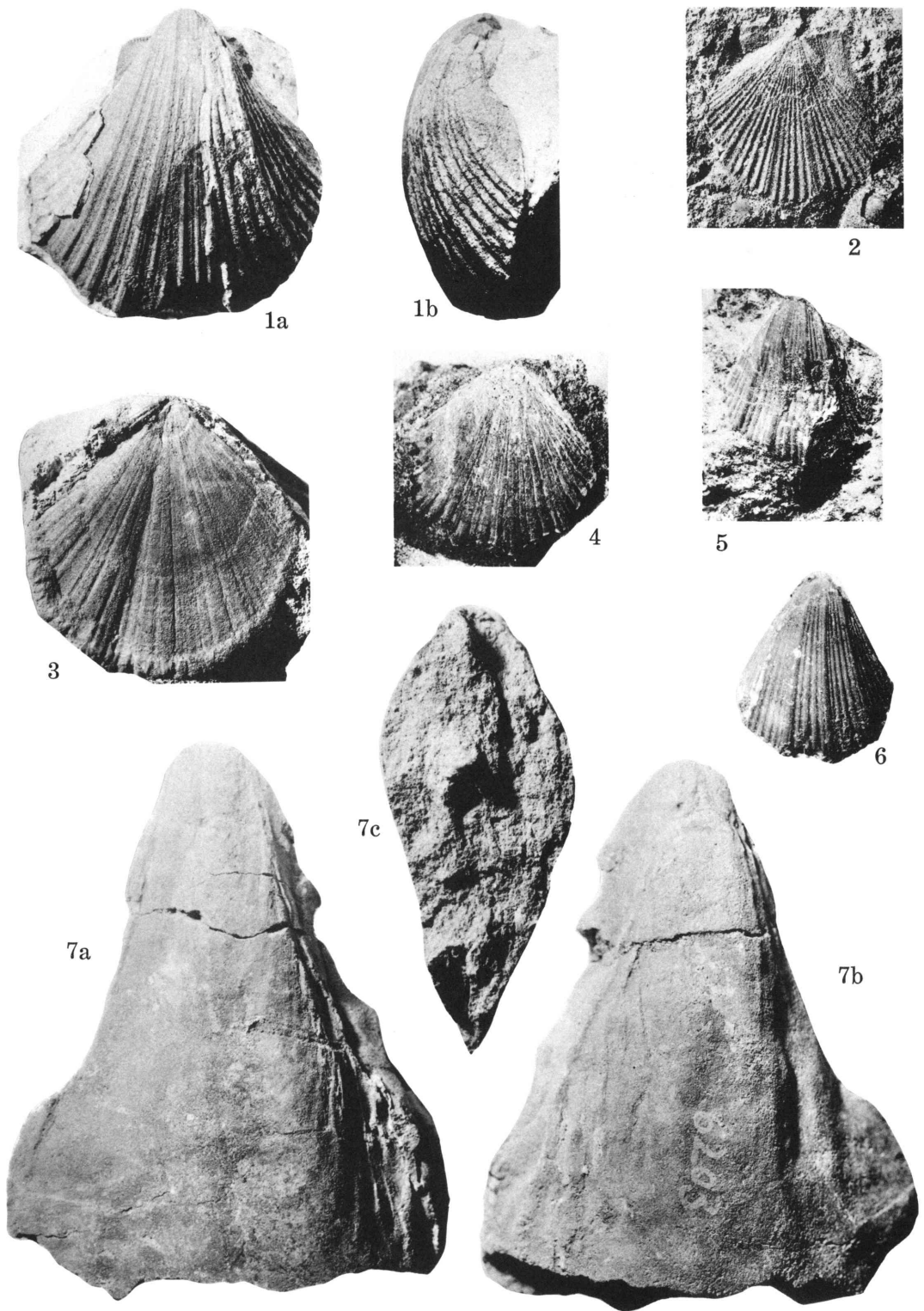
I. HAYAMI: Lower Cretaceous marine Pelecypods of Japan

Plate 40

Explanation of Plate 40

- Fig. 1-6. *Neithea* (*Neithea*) *nipponica* sp. nov.Page 296
1. Right valve (GK.H6263) $\times 1.2$. Holotype. Aketo formation at Hn. 6201, northeast of Raga, Tanohata village, Iwate Pref. (HANAI coll.) 1a: side view, 1b: anterior view.
 2. Left valve (GK.H6265) $\times 1.5$. Paratype. "Orbitolina sandstone" of the Miyako group at Hn. 6203, northeast of Raga, the same village. (HAYAMI coll.)
 3. Interior of left valve (GK.H6264) $\times 1.2$. Paratype. Aketo formation at Hn. 6201, northeast of Raga, the same village. (HANAI coll.)
 4. Interior of left valve (GK.H6365) $\times 1.8$. "Orbitolina sandstone" of the Miyako group of Hn. 6203, northeast of Raga, the same village. (HAYAMI coll.)
 5. Right valve (GK.H6266) $\times 1.5$. Paratype. Loc. ditto. (HAYAMI coll.)
 6. Right valve (GK.H6364) $\times 1.5$. Paratype. "Orbitolina sandstone" of the Miyako group at Hn. 0671, northeast of Raga, the same village. (HAYAMI coll.)
- Fig. 7. *Atrina* *heiensis* sp. nov.Page 283
7. Both valves (GK.H6262) $\times 1$. Holotype. "Orbitolina sandstone" at Hn. 6203, northeast of Raga, the same village (HANAI and HAYAMI coll.) 7a: right view, 7b: left view, 7c: postero-ventral view.

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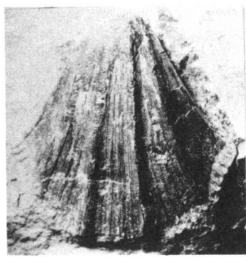
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Plate 41

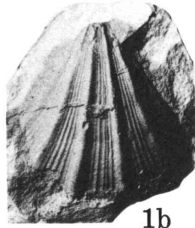
Explanation of Plate 41

- Figs. 1-7. *Neithea (Neithea) matsumotoi* sp. nov.Page 297
- 1a. Right internal mould (GK.H6125) $\times 1.5$. Holotype. Yatsushiro formation at Km. 3037, Miyaji, Yatsushiro City, Kumamoto Pref. (KANMERA and FUJII coll.)
 - 1b. Plaster cast of the same external mould, $\times 1.5$.
 - 2a. Right internal mould (GK.H6131) $\times 1$. Paratype. Yatsushiro formation at the southwest of Bisho, Toyo village, Kumamoto Pref. (AKATSU coll.)
 - 2b. Plaster cast from the same external mould, $\times 1$.
 - 3a. Right internal mould (GK.H6126) $\times 2$. Paratype. Yatsushiro formation at Km. 3037, Miyaji, Yatsushiro City, Kumamoto Pref. (KANMERA and FUJII coll.)
 - 3b. Plaster cast from the same external mould, $\times 1.2$.
 4. Right valve (GK.H6127) $\times 1$. Paratype. Yatsushiro formation at the southwest of Bisho, Toyo village, Kumamoto Pref. (AKATSU coll.)
 5. Left internal mould (GK.H6631) $\times 1$. Paratype. Yatsushiro formation at Km. 3037, Miyaji, Yatsushiro City, Kumamoto Pref. (KANMERA and FUJII coll.)
 6. Left external mould (GK.H6129) $\times 1.5$. Paratype. Loc. ditto. (KANMERA and FUJII coll.)
 - 7a. Left internal mould (GK.H6118) $\times 1$. Paratype. Loc. ditto. (KANMERA and FUJII coll.)
 - 7b. Plaster cast from the same external mould, $\times 1$.
- Figs. 8-10. *Neithea (Neithea) amanoi* sp. nov.Page 299
8. Right internal mould (GK.H6267) $\times 1.5$. Holotype. Hagino formation at Hy. 6011, Hagino, Mirafu village, Kochi Pref. (OGAWA coll.)
 9. Right internal mould (GK.H6270) $\times 1.5$. Paratype. Loc. ditto. (OGAWA coll.)
 10. Right internal mould (GK.H6271) $\times 1.5$. Paratype. Loc. ditto. (OGAWA coll.)

All specimens illustrated are kept in the Department of Geology, Kyushu University.



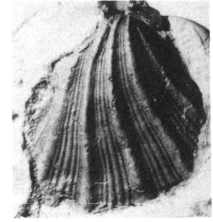
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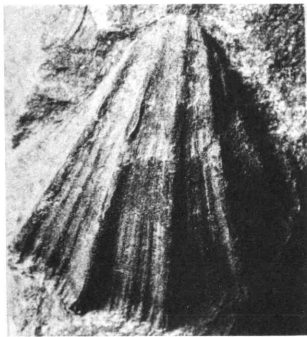
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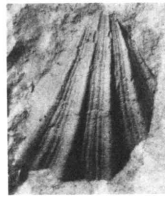
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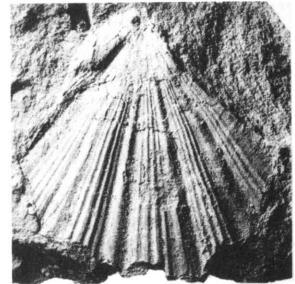
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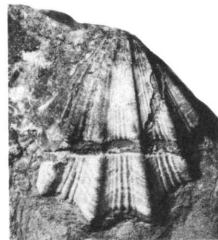
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3b



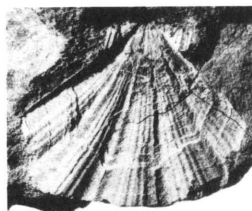
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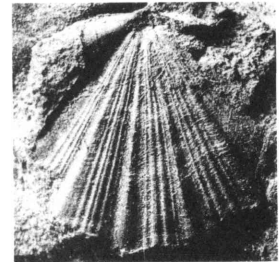
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7b



7a



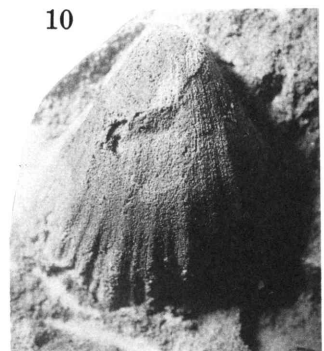
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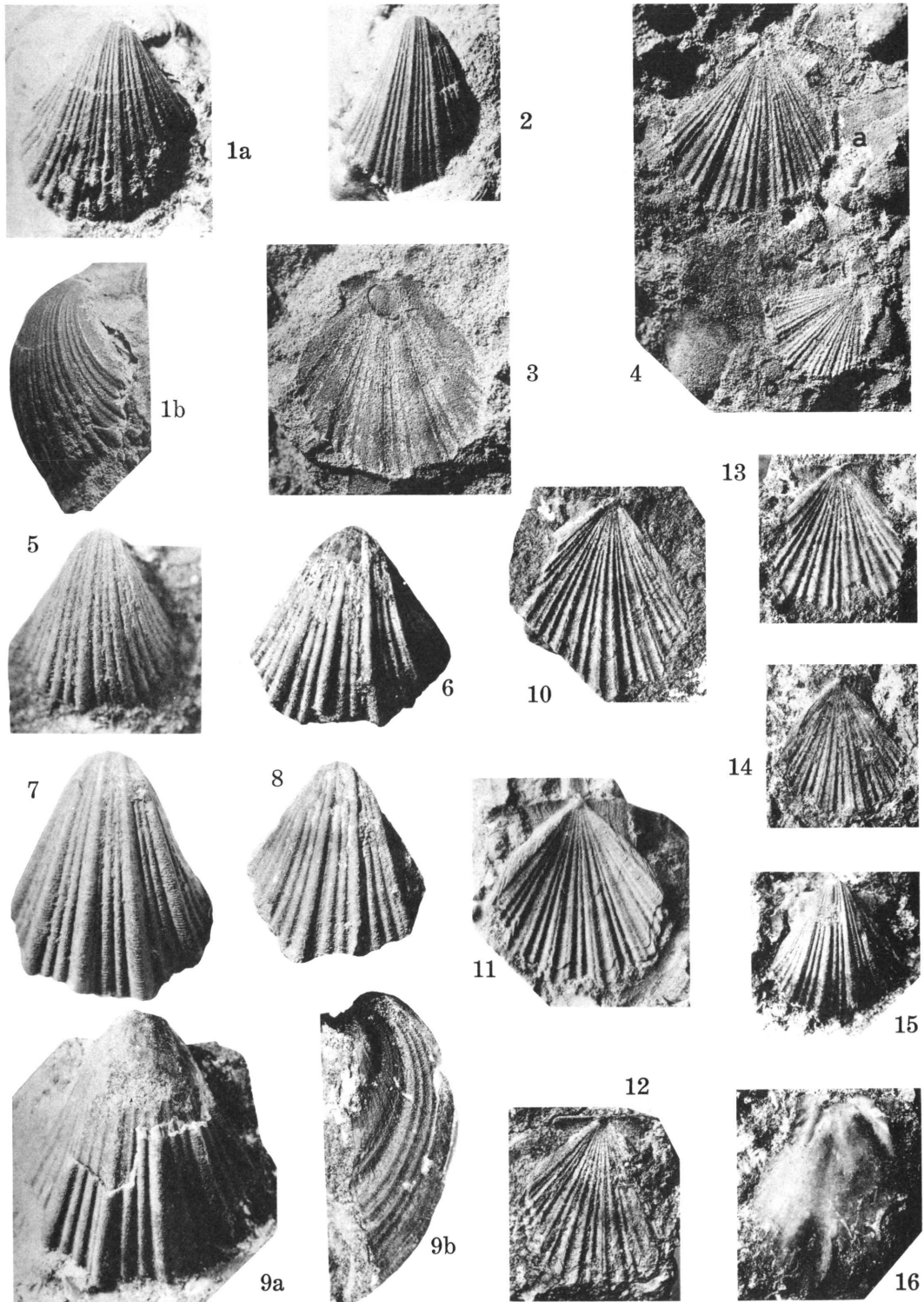
10

Plate 42

Explanation of Plate 42

- Figs. 1-4. *Neithea (Neithea) amanoi* sp. nov.Page 299
1. Clay cast from a right external mould (GK.H6268) $\times 1.5$. Paratype. Hagino formation at Hy. 6011, Hagino, Mirafu village, Kochi Pref. (OGAWA coll.)
 2. Clay cast from a right external mould (GK.H6269) $\times 1.5$. Paratype. Loc. ditto. (OGAWA coll.)
 3. Left internal mould (GK.H6274) $\times 1.5$. Paratype. Loc. ditto. (OGAWA coll.)
 4. Two left external moulds on a slab, $\times 1.5$. Paratypes. a: GK.H6272, b: GK.H 6273. Loc. ditto. (OGAWA coll.)
- Figs. 5-16. *Neithea (Neithea) ficalhoi* (CHOFFAT)Page 302
5. Right valve (GK.H6275) $\times 3$. Hiraiga formation at Hn. 0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)
 6. Right valve (GK.H6278) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
 7. Right valve (GK.H6277) $\times 3$. Loc. ditto. (HAYAMI coll.)
 8. Right valve (GK.H6367) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
 9. Right valve (GK.H6276) $\times 1.5$. Loc. ditto. (HAYAMI coll.) 9a: side view, 9b: posterior view.
 10. Left valve (GK.H6368) $\times 1.5$. Hiraiga formation at Hn. 0016, south of Hiraiga, Tanohata village, Iwate Pref. (HANAI coll.)
 11. Left valve (GK.H6617) $\times 2$. Hiraiga formation at Hn. 0017, south of Hiraiga, the same village. (HAYAMI coll.)
 12. Left valve (GK.H6280) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
 13. Left valve (GK.H6369) $\times 2$. Hiraiga formation at Hn. 0018, south of Hiraiga, the same village. (HAYAMI coll.)
 14. Left valve (GK.H6279) $\times 2$. Loc. ditto. (HAYAMI coll.)
 15. Right valve (GK.H6636) $\times 1.8$. Hiraiga formation at Hn. 0017, south of Hiraiga, the same village (HAYAMI coll.)
 16. Interior of right valve (GK.H6281) $\times 1.5$. Loc. ditto. (HANAI and HAYAMI coll.)

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Plate 43

Explanation of Plate 43

- Figs. 1-5. *Neithea (Neithea) kanmerai* sp. nov.Page 305
1. Right internal mould (GK.H6133) $\times 1$. Paratype. Hinagu formation at Km. 3085c, south of Kohara, Toyo village, Kumamoto Pref. (KANMERA coll.)
 2. Right internal mould (GK.H6135) $\times 1$. Paratype. Loc. ditto. (KANMERA coll.)
 3. Right internal mould (GK.H6132) $\times 1$. Holotype. Loc. ditto. (KANMERA coll.)
 4. Right internal mould (GK.H6134) $\times 1$. Paratype. Loc. ditto. (KANMERA coll.)
 5. Right internal mould (GK.H6608) $\times 1$. Paratype. Arita formation at Ys.103, west of Kumai, Yuasa town, Wakayama Pref. (MATSUMOTO et al. coll.)
- Fig. 6. *Neithea (s. l.) aketoensis* sp. nov.Page 309
6. Right valve (GK.H6284) $\times 1$. Holotype. Aketo formation at Hn. 6201, northeast of Raga, Tanohata village, Iwate Pref. (HANAI coll.)
- Fig. 7. *Neithea (Neithea)* sp. indet.Page 301
7. Right internal mould (GK.H6275) $\times 1.2$. Ishido formation at Hy. 4001, south of Kagahara, Nakazato village, Gumma Pref. (ICHIKAWA and HAYAMI coll.)

All specimens illustrated are kept in the Department of Geology, Kyushu University.

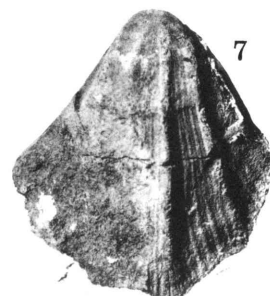
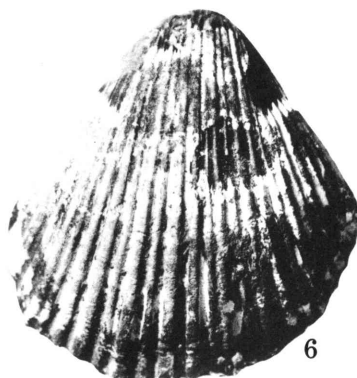
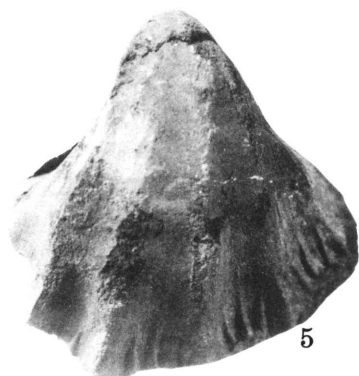
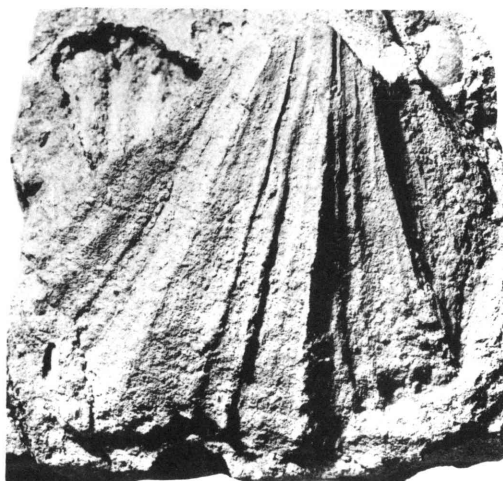
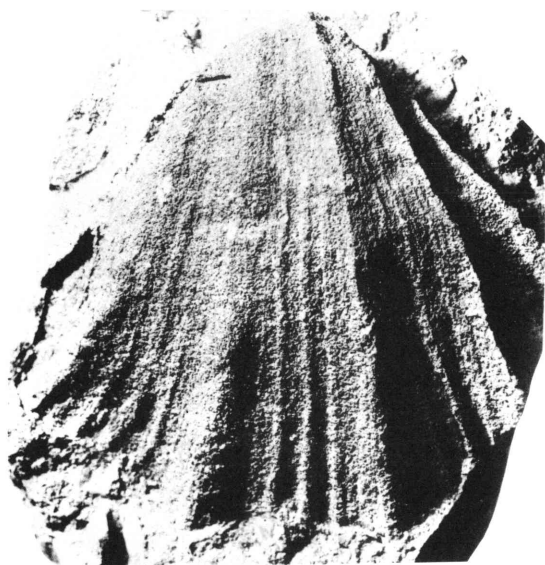
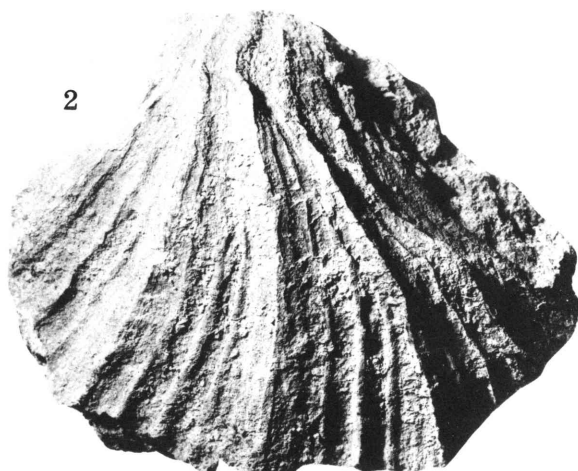
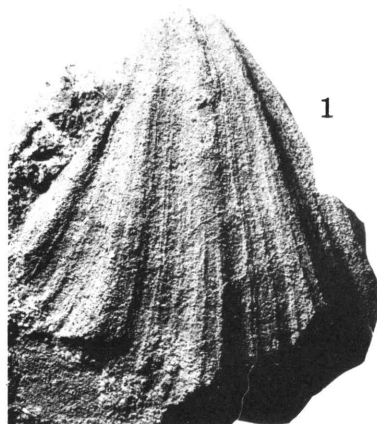
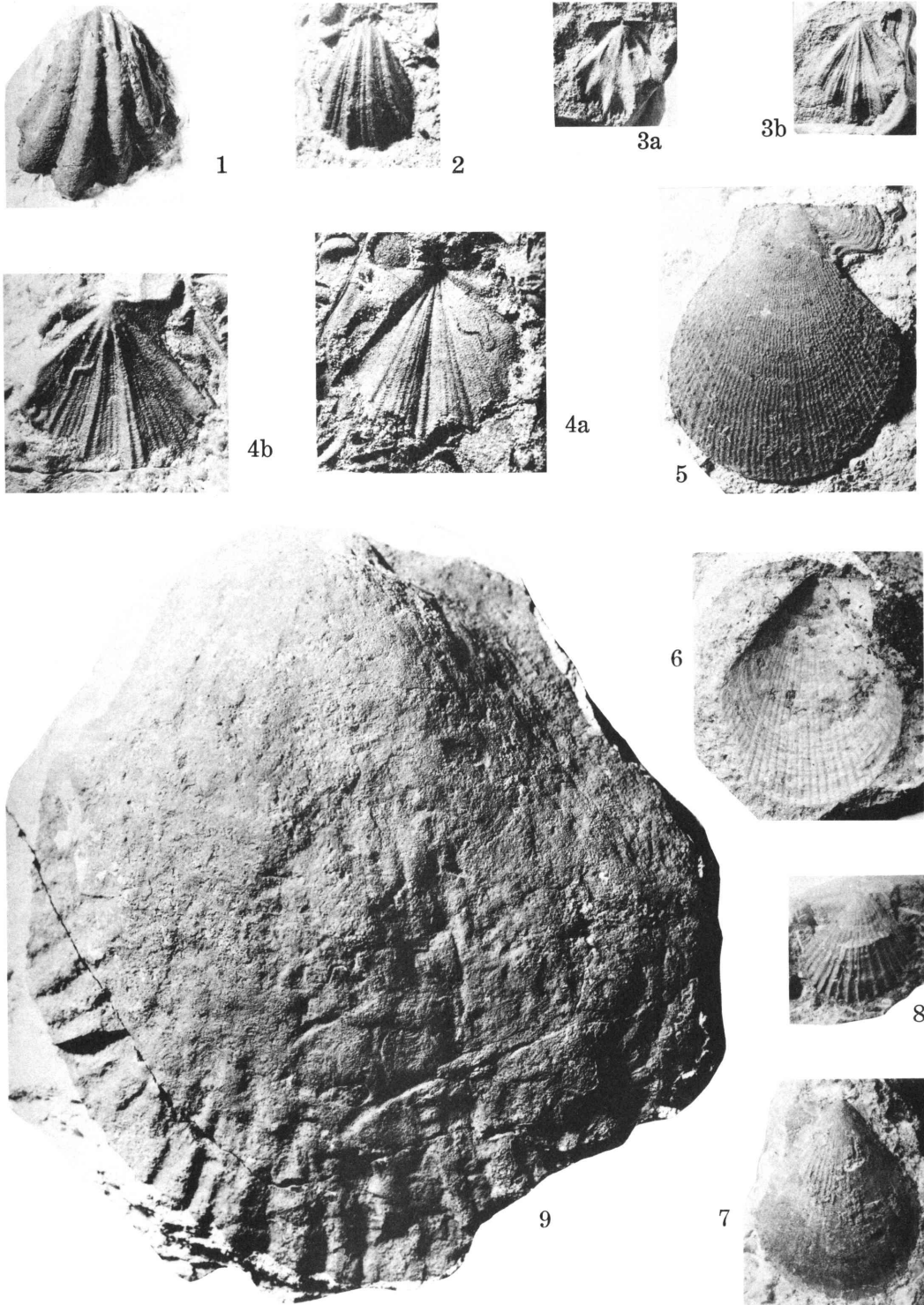


Plate 44

Explanation of Plate 44

- Figs. 1-4. *Neithea* (*Neithella*) sp. cf. *N. (N.) atava* (RÖMER).....Page 307
1. Right valve (GK.H6281) ×2. Hiraiga formation at Hn.0013, south of Hiraiga, Tanohata village, Iwate Pref. (HANAI and HAYAMI coll.)
 2. Clay cast from a right external mould (GK.H6371) ×2. Ishido formation at Hy.4011, Ishido, Ohinata village, Nagano Pref. (HAYAMI coll.)
 - 3a. Left internal mould (GK.H6282) ×1. Loc. ditto. (ICHIKAWA coll.)
 - 3b. Clay cast from the same external mould, ×1.
 - 4a. Left external mould (GK.H6283) ×2. Loc. ditto. (HAYAMI coll.)
 - 4b. Clay cast from the same external mould, ×2.
- Figs. 5-7. *Chlamys robinaldina* D'ORBIGNYPage 310
5. Right valve (GK.H6285) ×2. Hiraiga formation at Hn.0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)
 6. Interior of left valve (GK.H6287) ×1.5. Hiraiga formation at Hn.0103, south of Raga, the same village. (HANAI coll.)
 7. Left valve (GK.H6286) ×1.5. Hiraiga formation at Hn.0018, south of Hiraiga, the same village. (HAYAMI coll.)
- Fig. 8. *Chlamys* (?) *shikokuensis* sp. nov.....Page 312
8. Left internal mould (GK.H6289) ×1.5. Lower Monobegawa subgroup at Okunominotani, southwest of Ryoseki, Nangoku City, Kochi Pref. (KIMURA coll.)
- Fig. 9. *Prohinnites* sp. cf. *P. favrinus* (PCTET and ROUX)Page 313
9. Left internal mould (GK.H6290) ×0.7. Tanohata formation at south of Hiraiga, Tanohata village, Iwate Pref. (exactly unknown) (HAYAMI coll.)

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Plate 45

Explanation of Plate 45

- Fig. 1. *Chlamys* sp. cf. *C. subacuta* (LAMARCK)Page 312
1. Both valves (GK.H6288) $\times 1.5$. Aketo formation at Hn. 6201, northeast of Raga, Tanohata village, Iwate Pref. (HANAI coll.) 1a: left valve, 1b: right valve.
- Figs. 2-11. *Pectinella miyakoensis* (NAGAO)Page 318
2. Right valve (GK.H6295) $\times 2$. Hiraiga formation at Hn. 0017, south of Hiraiga, the same village. (HAYAMI coll.)
 3. Right valve (GK.H6299) $\times 2$. Loc. ditto. (HAYAMI coll.)
 4. Right valve (GK.H6298) $\times 2$. Loc. ditto. (HAYAMI coll.)
 5. Right valve (GK.H6621) $\times 2$. Loc. ditto. (HAYAMI coll.)
 6. Interior of right valve (GK.H6622) $\times 2$. Loc. ditto. (HANAI and HAYAMI coll.)
 7. Left valve (GK.H6618) $\times 2$. Loc. ditto. (HAYAMI coll.)
 8. Left valve (GK.H6619) $\times 2$. Loc. ditto. (HAYAMI coll.)
 9. Right valve (GK.H6297) $\times 2$. Loc. ditto. (HANAI and HAYAMI coll.)
 10. Left valve (GK.H6620) $\times 2$. Loc. ditto. (HAYAMI coll.)
 11. Right valve (GK.H6296) $\times 2$. Loc. ditto. (HAYAMI coll.)
- Figs. 12, 13. *Entolium sanchuense* sp. nov.Page 315
12. Right valve (GK.H6291) $\times 0.9$. Holotype. Ishido formation at Hy. 4001, south of Kagahara, Nakazato village, Gumma Pref. (ICHIKAWA and HAYAMI coll.)
 13. Left internal mould (GK.H6292) $\times 1$. Paratype. Loc. ditto. (ICHIKAWA and HAYAMI coll.)

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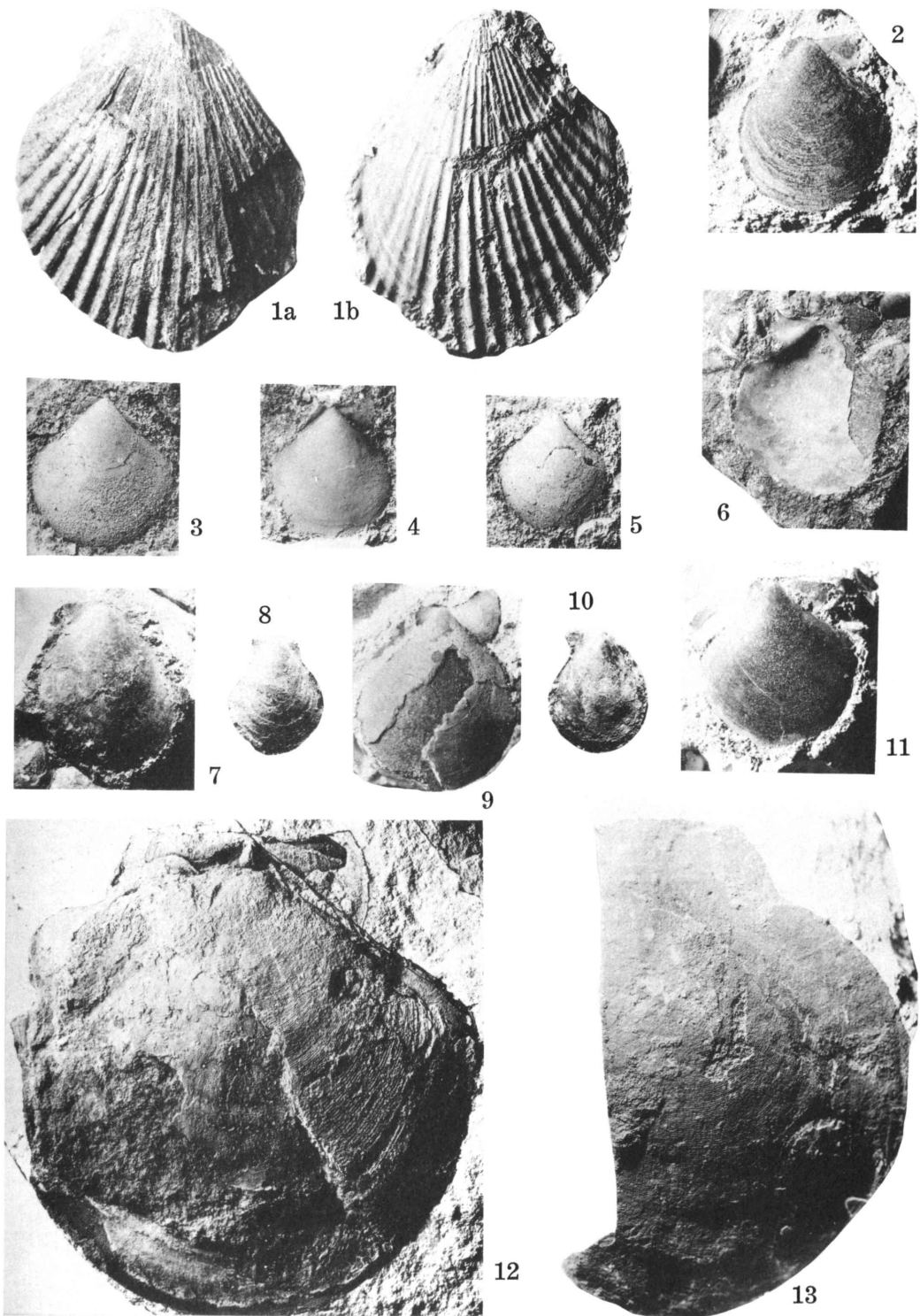


Plate 46

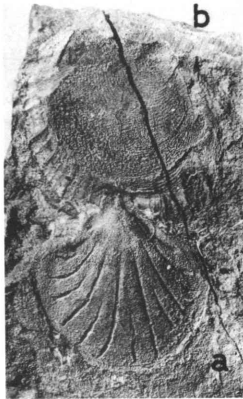
Explanation of Plate 46

- Figs. 1-4. *Variamussium kimurai* sp. nov.Page 320
1. Right external mould (GK.H6301) $\times 2$. Holotype. Lower Monobegawa subgroup at Hy. 6002, Okunominotani, southwest of Ryoseki, Nangoku City, Kochi Pref. (HAYAMI coll.)
 2. Two specimens adhering to a slab, $\times 2$. Paratypes. a: right internal mould (GK.H6305), b: left internal mould and right external mould of a single specimen (GK.H6304). Loc. ditto. (HAYAMI coll.)
 3. Left external mould (GK.H6303) $\times 2$. Paratype. Loc. ditto. (HAYAMI coll.)
 4. Left external mould (GK.H6302) $\times 2$. Paratype. Loc. ditto. (HAYAMI coll.)
- Fig. 5. *Pectinella miyakoensis* (NAGAO)Page 318
5. Numerous specimens adhering to a slab (GK.H6375) $\times 1$. Hiraiga formation at Hn. 0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)
- Figs. 6-8. *Plicatula kiiensis* sp. nov.Page 323
6. Right external mould (GK.H6591) $\times 1.5$. Paratype. Arita formation at Ys. 103, west of Kumai, Yuasa town, Wakayama Pref. (MATSUMOTO et al. coll.)
 - 7a. Left external mould (GK.H6590) $\times 1.5$. Holotype. Loc. ditto. (MATSUMOTO et al. coll.)
 - 7b. Clay cast from the same external mould, $\times 1.5$.
 8. Left external mould (GK.H6592) $\times 1.5$. Paratype. Hinagu formation at Km. 3085c, south of Kohara, Toyo village, Kumamoto Pref. (KANMERA coll.)

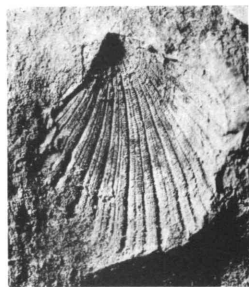
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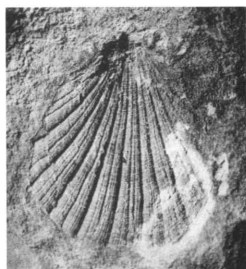
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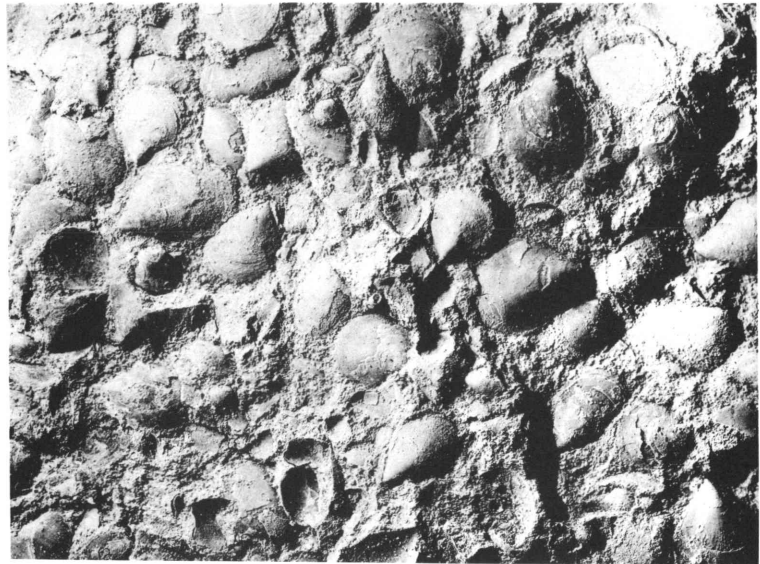
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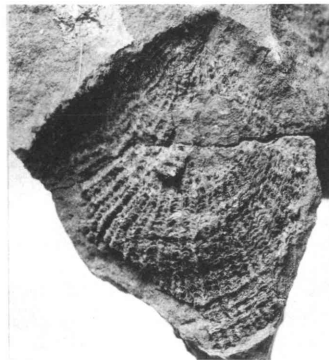
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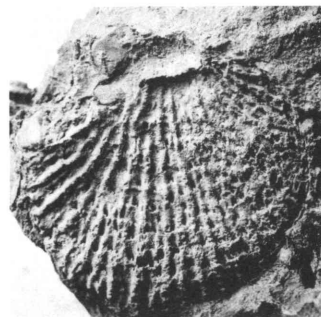


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7a

8



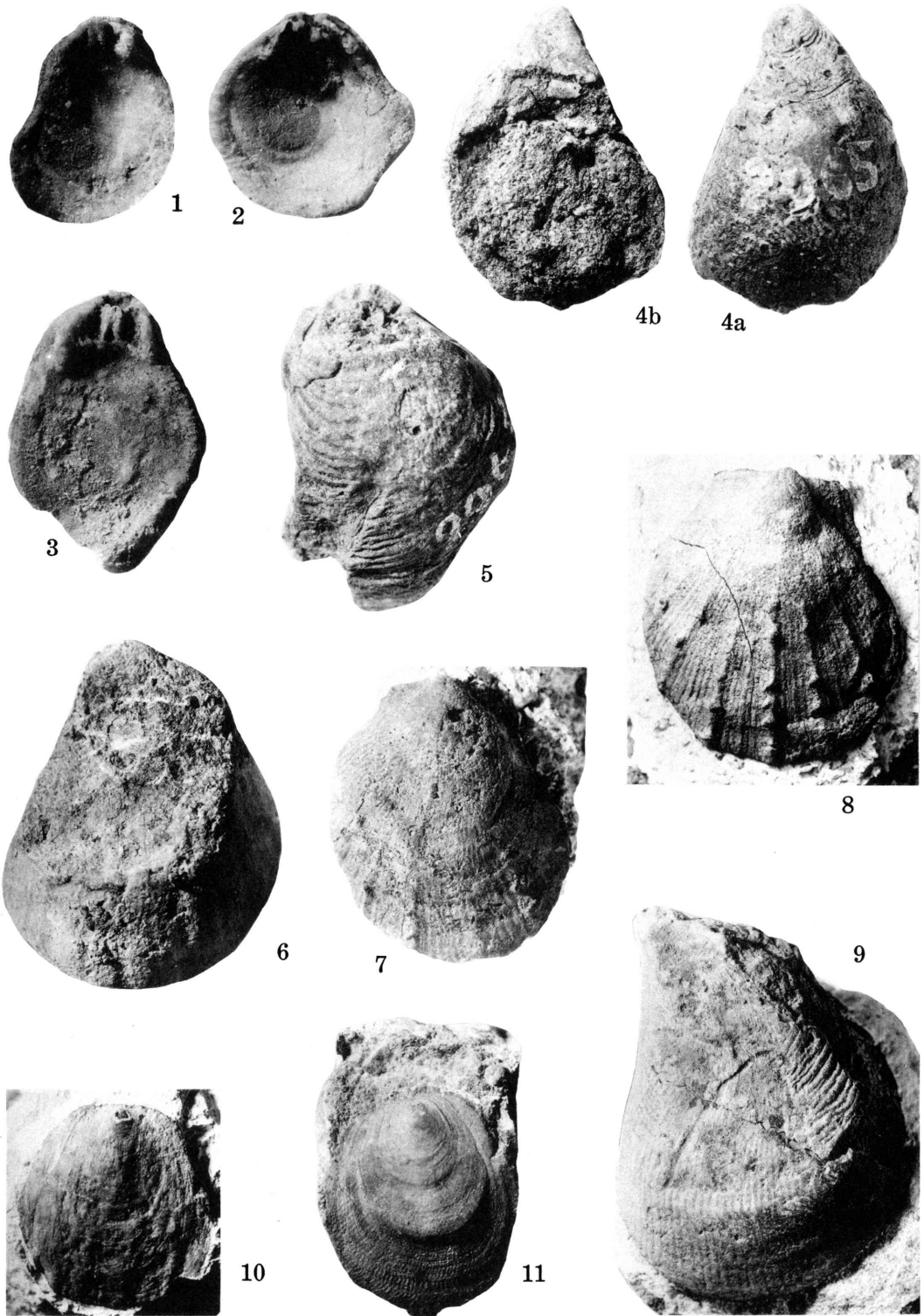
7b

Plate 47

Explanation of Plate 47

- Figs. 1-3. *Plicatula hanaii* sp. nov.Page 322
1. Interior of left valve (GK.H6312) $\times 2$. Paratype. Tanohata formation at Hn. 0803, Koikorobe, Tanohata village, Iwate Pref. (HAYAMI coll.)
 2. Interior of left valve (GK.H6311) $\times 2$. Holotype. Loc. ditto. (HAYAMI coll.)
 3. Interior of left valve (GK.H6313) $\times 2$. Paratype. Loc. ditto. (HAYAMI coll.)
- Figs. 4-9. *Spondylus decoratus* NAGAOPage 324
4. Right valve (GK.H6310) $\times 1$. 1st cycle of the Miyako group at Hn. 2065, Hideshima, Miyako City, Iwate Pref. (HANAI coll.) 4a: exterior, 4b: interior.
 5. Right valve (GK.H6388) $\times 1.5$. Loc. ditto. (HANAI coll.)
 6. Right valve (GK.H6376) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
 7. Left valve (GK.H6307) $\times 1.5$. Loc. ditto. (HANAI coll.)
 8. Left valve (GK.H6306) $\times 1.5$. Loc. ditto. (HANAI coll.)
 9. Right valve (GK.H6309) $\times 1$. 1st cycle of the Miyako group at the north of Moshi, Iwaizumi town, Iwate Pref. (exactly unknown) (HANAI coll.)
- Figs. 10, 11. *Monia aptiana* sp. nov.Page 335
10. Left valve (GK.H6327) $\times 1.2$. Paratype. Hiraiga formation at Hn. 0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)
 11. Left valve (GK.H6326) $\times 3$. Holotype. Loc. ditto. (HAYAMI coll.)

All specimens illustrated are kept in the Department of Geology, Kyushu University.



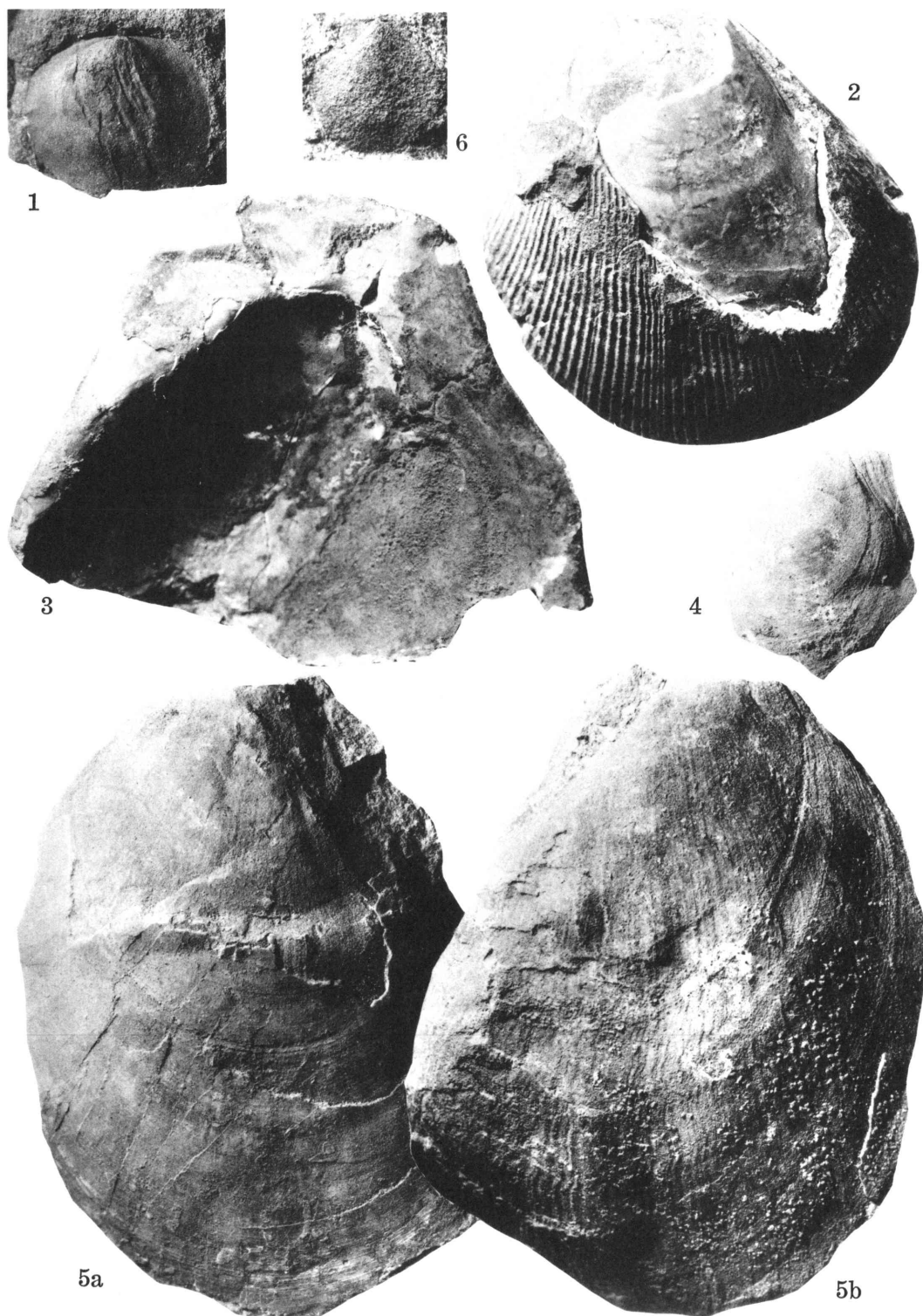
I. HAYAMI: Lower Cretaceous marine Pelecypods of Japan

Plate 48

Explanation of Plate 48

- Fig. 1. *Monia* sp. cf. *M. pseudotruncata* (YABE and NAGAO)Page 335
1. Left internal mould (GK.H6328) $\times 1.5$. Yatsushiro formation at Km.3035, Miyaji, Yatsushiro City, Kumamoto Pref. (KANMERA coll.)
- Fig. 2. *Plagiostoma (Plagiostoma) sanrikuense* sp. nov.Page 326
2. Right valve (GK.H6315) $\times 1$. Holotype. Hiraiga formation at Hn.0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)
- Figs. 3, 4. *Plagiostoma (Acesta) goliathiforme* sp. nov.Page 327
3. Interior of right valve (GK.H6316) $\times 1$. Holotype. Loc. ditto. (HAYAMI coll.)
4. Left valve (GK.H6317) $\times 1$. Paratype. Hiraiga formation at Haipe, the same village (exactly unknown). (HANAI coll.)
- Fig. 5. *Ctenoides subrapa* (NAGAO)Page 330
5. Both valves (GK.H6319) $\times 0.9$. Hiraiga formation at Haipe, the same village (exactly unknown). (HANAI coll.)
- Fig. 6. *Entolium* (?) *yatsushiroense* sp. nov.Page 316
6. Left internal mould (GK.H6294) $\times 2$. Holotype. Yatsushiro formation at Km. 1843, north of Shimofukami, Sakamoto town, Kumamoto Pref. (HAYAMI coll.)

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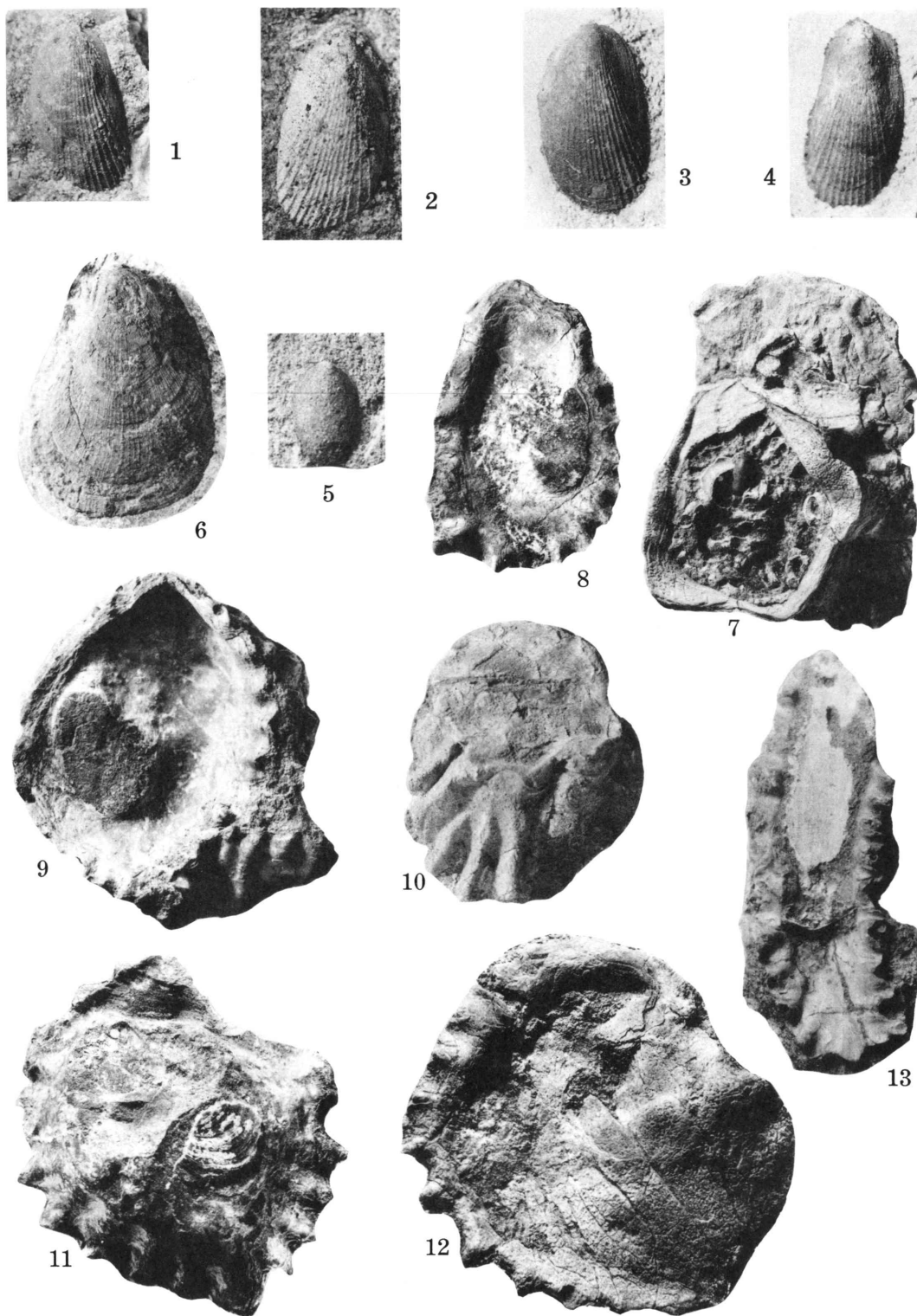
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Plate 49

Explanation of Plate 49

- Figs. 1-4. *Limatula nagaoui* sp. nov.Page 332
1. Right valve (GK.H6323) ×3. Paratype. Hiraiga formation at Hn. 0018, south of Hiraiga, Tanohata village, Iwate Pref. (HANAI and HAYAMI coll.)
 2. Left valve (GK.H6322) ×3. Paratype. Loc. ditto. (HAYAMI coll.)
 3. Right valve (GK.H6321) ×3. Holotype. Loc. ditto. (HAYAMI coll.)
 4. Left valve (GK.H6324) ×3. Paratype. Loc. ditto. (HANAI and HAYAMI coll.)
- Fig. 5. *Limatula ishidoensis* (YABE and NAGAO)Page 331
5. Internal mould of right (or left) valve (GK.H6325) ×3. Ishido formation at Hy. 4011, Ishido, Ohinata village, Nagano Pref. (HAYAMI coll.)
- Fig. 6. *Antiquilima ultima* sp. nov.Page 329
6. Left valve (GK.H6318) ×1. Holotype. 2nd cycle of the Miyako group at Hn. 4053, Oshima, off the coast of Moshi, Iwaizumi town, Iwate Pref. (HAYAMI coll.)
- Fig. 7. *Liostrea* sp. ex gr. *L. cunabula* (SEELEY)Page 336
7. Interior of left valve (GK.H6329) ×1. Tanohata formation at Hn. 0803, Koikorobe, Tanohata village, Iwate Pref. (HANAI coll.)
- Figs. 8-11. *Lopha (Lopha) nagaoui* sp. nov.Page 338
8. Interior of right valve (GK.H6334) ×1. Tanohata formation at Hn. 0802, Koikorobe, the same village. (HANAI and HAYAMI coll.)
 9. Interior of left valve (GK.H6330) ×1. Holotype. Loc. ditto. (HAYAMI coll.)
 10. Left valve (GK.H6332) ×1. Paratype. Loc. ditto. (HANAI and HAYAMI coll.)
 11. Left internal mould (GK.H6331) ×1. Paratype. Hiraiga formation at Hn. 0017, south of Hiraiga, the same village. (HAYAMI coll.)
- Fig. 12. *Amphidonta (Ceratostreon) yabei* NAGAOPage 345
12. Interior of right valve (GK.H6338) ×0.9. Tanohata formation at Hn. 0705, Koikorobe, the same village. (HANAI coll.)
- Fig. 13. *Lopha (Arctostrea) carinata* (LAMARCK)Page 340
13. Interior of right valve (GK.H6335) ×1.5. Hiraiga formation at Hn. 0480, north of Hiraiga, the same village (HANAI coll.)

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Plate 50

Explanation of Plate 50

- Fig. 1. *Lopha (Lopha) nagaoi* sp. nov.Page 338
1. Interior of left valve (GK.H6627) $\times 1.5$. Paratype. Tanohata formation at Hn.0802, Koikorobe, Tanohata village, Iwate Pref. (HAYAMI coll.)
- Figs. 2-6. *Amphidonta (Ceratostreon) yabei* NAGAOPage 345
2. Interior of left valve (GK.H6390) $\times 1.5$. Loc. ditto. (HAYAMI coll.)
 3. Interior of left valve (GK.H6337) $\times 0.8$. Tanohata formation at Hn.0803, Koikorobe, the same village. (HANAI and HAYAMI coll.)
 4. Interior of left valve (GK.H6336) $\times 1$. Loc. ditto. (HANAI and HAYAMI coll.)
 5. Interior of left valve (GK.H6340) $\times 1$. Tanohata formation at Hn.0803, Koikorobe, the same village. (HAYAMI coll.)
 6. Interior of right valve (GK.H6339) $\times 0.9$. Loc. ditto. (HANAI and HAYAMI coll.)
- Figs. 7-9. *Amphidonta (Amphidonta) subhaliotoidea* (NAGAO)Page 343
7. Right valve (GK.H6628) $\times 1$. Hiraiga formation at Hn.0024, south of Hiraiga, the same village (HANAI coll.)
 8. Right valve (GK.H6344) $\times 0.9$. 1st cycle of the Miyako group at the north of Moshi, Iwaizumi town, Iwate Pref. (exactly unknown) (HANAI coll.)
 9. Left valve (GK.H6623) $\times 1$. Hiraiga formation at Hn.0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)

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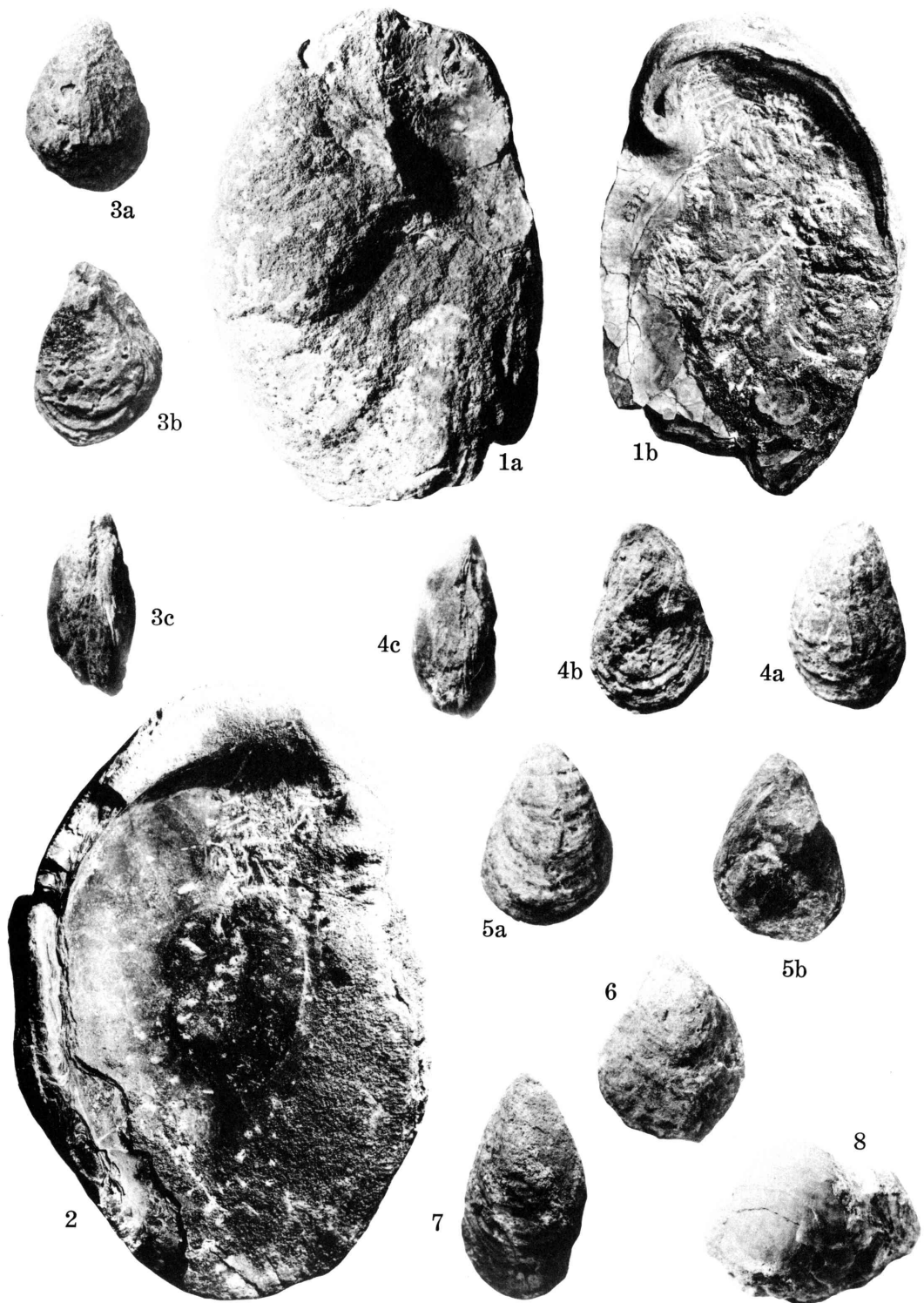
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Plate 51

Explanation of Plate 51

- Figs. 1, 2. *Amphidonta (Amphidonta) subhaliotoidea* (NAGAO)Page 343
1. Left valve (GK.H6343) $\times 1$. Hiraiga formation at Hn.0310, north of Hiraiga, Tanohata village, Iwate Pref. (HANAI coll.) 1a: exterior, 1b: interior.
 2. Interior of right valve (GK.H6342) $\times 0.9$. Tanohata formation at Hn.0802, Koi-korobe, the same village. (HAYAMI coll.)
- Figs. 3-7. *Gryphaea (s. l.) oshimensis* sp. nov.Page 348
3. Both valves (GK.H6348) $\times 2$. Paratype. Oshima formation at Hy.0009, Yokonuma, Oshima island, Kesenuma City, Miyagi Pref. (OBATA and HAYAMI coll.) 3a: left view, 3b: right view, 3c: posterior view.
 4. Both valves (GK.H6347) $\times 2$. Paratype. Loc. ditto. (OBATA and HAYAMI coll.) 4a: left view, 4b: right view, 4c: posterior view.
 5. Both valves (GK.H6346) $\times 2$. Holotype. Loc. ditto. (OBATA and HAYAMI coll.) 5a: left view, 5b: right view.
 6. Left valve of bivalved specimen (GK.H6349) $\times 2$. Paratype. Loc. ditto. (OBATA and HAYAMI coll.)
 7. Left valve of bivalved specimen (GK.H6629) $\times 2$. Paratype. Loc. ditto. (OBATA and HAYAMI coll.)
- Fig. 8. *Gryphaeostrea* sp. ex gr. *G. vesicularis* (LAMARCK)Page 337
8. Left valve (GK.H6350) $\times 1.5$. Hiraiga formation at Hn.0017, south of Hiraiga, Tanohata village, Iwate Pref. (HAYAMI coll.)

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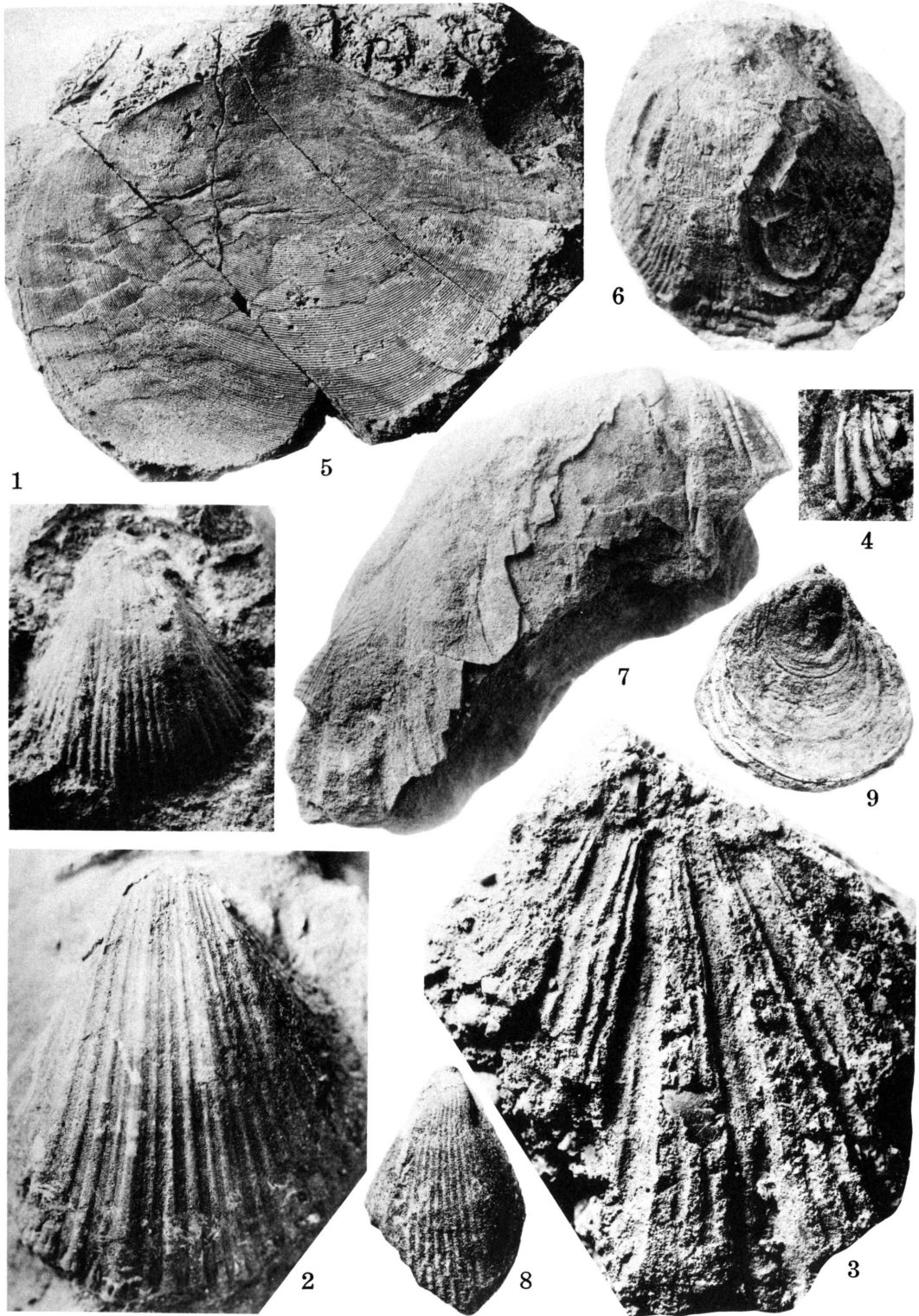
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Plate 52

Explanation of Plate 52

- Figs. 1, 2. *Neithea* (*Neithea*) *nipponica* sp. nov.Page 296
1. Right valve (GK.H6633) $\times 1.5$. Aketo formation at Hn. 6201, northeast of Raga, Tanohata village, Shimohei County, Iwate Pref. (OBATA coll.)
 2. Right valve (GK.H6632) $\times 1.5$. Paratype. Loc. ditto. (OBATA coll.)
- Fig. 3. *Neithea* (*Neithea*) *kanmerai* sp. nov.Page 305
3. Right external mould (GK.H6134) $\times 1$. Paratype. Hinagu formation at Km. 3085c, south of Kohara, Toyo village, Yatsushiro County, Kumamoto Pref. (KANMERA coll.)
- Fig. 4. *Neithea* (*Neithella*) sp. cf. *N. (N.) atava* (RÖMER)Page 307
4. Left valve (GK.H6628) $\times 2$. Hiraiga formation at Hn. 0299, north of Hiraiga, Tanohata village, Shimohei County, Iwate Pref. (HAYAMI coll.)
- Fig. 5. *Entolium sanchuense* sp. nov.Page 315
5. Left external mould (GK.H6292) $\times 1$. Paratype. Ishido formation at Hy. 4001, south of Kagahara, Nakazato village, Tano County, Gumma Pref. (ICHIKAWA and HAYAMI coll.)
- Fig. 6. *Spondylus decoratus* NAGAOPage 324
6. Left valve (GK.H6308) $\times 1.5$. 1st cycle of the Miyako group at Hn. 2065, Hide-shima, Miyako City, Iwate Pref. (HANAI coll.)
- Fig. 7. *Ctenoides subrapa* (NAGAO)Page 330
7. Right valve (GK.H6320) $\times 1$. Hiraiga formation at the north of Haibe, Tanohata village, Shimohei County, Iwate Pref. (HANAI coll.)
- Fig. 8. *Limatula* sp. cf. *L. tombeckiana* (D'ORBIGNY)Page 331
8. ? Left valve (GK.H6634) $\times 2$. Tanohata formation at Hn. 0220, north of Hiraiga, Tanohata village, Shimohei County, Iwate Pref. (OBATA coll.)
- Fig. 9. *Gryphaea* (*s. l.*) *oshimensis* sp. nov.Page 348
9. Right valve (GK.H6637) $\times 2$. Paratype. Oshima formation at Hy. 1009, Yokonuma of Oshima island, Kesenuma City, Miyagi Pref. (OBATA and HAYAMI coll.)

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