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ARABANTHURA ENIGMATICA, A NEW GENUS AND SPECIES OF ANTHURID ISOPOD FROM THE ARABIAN GULF

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Abstract.—*Arabanthura enigmatica* is described from the northern Gulf of Arabia. The genus is characterized especially by the possession of a biarticulate mandibular palp, and a nonserrate lamina dentata. Females are blind, but premales develop eye-pigment, while mature males have well developed eyes of numerous ommatidia. The small overall size of males and premales as compared with ovigerous females, leads to speculation on the existence of primary males in the species.

Among the isopods collected by Dr. John McCain in the Arabian Gulf and submitted to the Smithsonian Institution for identification, was a species of anthurid, the generic placement of which proved difficult.

The material was collected during an intertidal and subtidal sampling program by Tetra Tech, Inc. in the northern Arabian Gulf. The station numbers used are those of this program. Type material has been deposited in the collections of the Smithsonian Institution, and given USNM catalogue numbers.

Arabanthura, new genus

Diagnosis.—Eyes and eye-pigment absent in female; eye pigment present in premale; eye-pigment and ommatidia present in male. Antenna 1, flagellum of 3 articles in female, of 26 articles in male. Antenna 2, flagellum of single article. Mandibular palp of 2 articles. Maxilliped of 4 articles; endite lacking. Pereopod 1 subchelate, propodus expanded. Pereopods 2 and 3 ambulatory. Pereopods 4–7, carpi with posterior margin longer than anterior margin. Pleopod 1, exopod operculiform. Pleonites 1–5 fused, pleonite 6 free. Telson with 2 basal statocysts.

Gender.—Feminine.

Type-species.—By present designation: *Arabanthura enigmatica,* new species.

Etymology.—The generic epithet is a combination of 'Arab-' from the Gulf of Arabia, and the frequently used suffix 'anthura.'

Remarks.—Of all the genera of the Anthuridae, only two possess a biarticulate mandibular palp, viz. *Venezanthura* Kensley, 1978, and *Rhiganthura* Kensley, 1978.

The latter genus possesses a pleon of five free short anterior pleonites and a large sixth pleonite fused with the telson, pleopod 1 having both rami forming the operculum, and a 5-articulate maxilliped with a strong endite. These three major features immediately separate *Rhiganthura* from *Arabanthura.*

Venezanthura, while having a similar pleonal structure to *Arabanthura,* possesses a biarticulate flagellum of antenna 1 in the female, a serrate lamina dentata, a 3-articulate maxilliped with endite, antennae 1 and 2 strongly interlocked, and

a strong palmar tooth on pereopod 1. These easily discerned features separate *Venezanthura* from *Arabanthura.*

The broad setose articles of pereopods 2–7 are reminiscent of *Centranthura caeca* (Kensley) from South Africa. This similarity probably reflects the fact that both species are infaunal sediment inhabitants.

Arabanthura enigmatica, new species
Figs. 1–3

Material.—Holotype, USNM 211343, ovig. ♀, TL 10.8 mm, Sta 4G3, Apr 1982, middle Manifa Bay, 1.3 m, seagrass and sand bottom, 26.6°C, salinity 42 ppt.

Paratypes, USNM 211344, 3 ♂, TL 6.1–6.5 mm, 7 pre-♂, TL 6.8–7.0 mm, 2 ovig. ♀, TL 9.0–10.0 mm, 24 non-ovig. ♀, 12 juvs., Sta 5G1, Mar 1982, northeastern Manifa Bay, 1.3 m, seagrass and sand bottom, 18.3°C, salinity 42 ppt.

Paratypes, USNM 211345, 2 pre-♂, TL 6.7–7.0 mm, 2 ovig. ♀, TL 9.6–10.1 mm, 3 non-ovig. ♀, 2 juvs., sta 5G2, Mar 1982, northeastern Manifa Bay, 1.3 m, seagrass and sand bottom, 18.3°C, salinity 42 ppt.

Other material: Sta 1G3, Nov 1981, 1 juv., off Manifa GOSP, 3 m, seagrass and sand bottom, 21.1°C, salinity 45 ppt.—Sta 5S3, Nov 1981, 1 non-ovig. ♀, 4 juvs., northeastern Manifa Bay, 2 m, sand bottom, 20.0°C, salinity 50 ppt.—Sta 5G2, Nov 1981, 8 non-ovig. ♀, 12 juvs., northeastern Manifa Bay, 1.3 m, seagrass and sand bottom, 20.0°C, salinity 50 ppt.—Sta 2G3, Mar 1982, 1 juv., near Ras Tanajib marine facility, 2 m, seagrass and sand bottom, 18.3°C, salinity 41 ppt.—Sta 4G1, Apr 1982, 2 ovig. ♀, TL 8.1–8.6 mm, 3 non-ovig. ♀, middle Manifa Bay, 1.3 m, seagrass and sand bottom, 26.6°C, salinity 42 ppt.—Sta 4G2, Apr/May 1982, 3 ovig. ♀, TL 9.0–9.8 mm, 1 non-ovig. ♀, 1 juv., 40 manca, middle Manifa Bay, 1.3 m, seagrass and sand bottom, 26.6°C, salinity 42 ppt.—Sta 4G3, Mar 1982, 2 non-ovig. ♀, middle Manifa Bay, 1.3 m, seagrass and sand bottom, 18.3°C, salinity 44 ppt.—Sta 4G3, Apr 1982, 8 ovig. ♀, TL 8.1–10.2 mm, 1 juv., middle Manifa Bay, 1.3 m, seagrass and sand bottom, 26.6°C, salinity 42 ppt.—Sta 5G3, Mar 1982, 2 pre-♂, TL 6.1–7.1 mm, 3 non-ovig. ♀, 8 juvs., northeastern Manifa Bay, 1.3 m, sand and seagrass bottom, 18.3°C, salinity 42 ppt.—Sta 8G2, Mar 1982, 1 non-ovig. ♀, off Bandar al Mishab, 2.3 m, sand and seagrass bottom, 17.7°C, salinity 41 ppt.

Description.—Ovigerous female: Body 11 times longer than wide; proportions: C < 1 < 2 < 3 < 4 < 5 > 6 > 7 < P. Head with broadly triangular rostrum extending anteriorly as far as anterolateral lobes. Pereonite 1 with shallow middorsal pit in anterior half. Dorsal articulation hollows between pereonites 1 and 2, and 2 and 3; pereonites 4–6 each with shallow middorsal pit. Pleonites 1–5 fused, fused pleonites indicated by faint undulations of ventrolateral margin. Pleonite 6 short, free, with middorsal notch in posterior margin (Fig. 1a). Telson dorsally gently convex, widest at midlength; posterior margin broadly rounded-truncate, with 6 elongate simple setae (Figs. 1a, 2g).

Antenna 1, peduncle of 3 broad articles; terminal flagellar article with 3 aesthetascs (Fig. 1d). Antenna 2, peduncle article 2 grooved to accommodate antenna 1; flagellar article setose (Fig. 1e). Distal mandibular palp article slightly less than half length of proximal article, with 1 or 2 elongate setae; right incisor consisting of single convex sclerotized plate, left incisor weakly trilobed, sclerotized; lamina

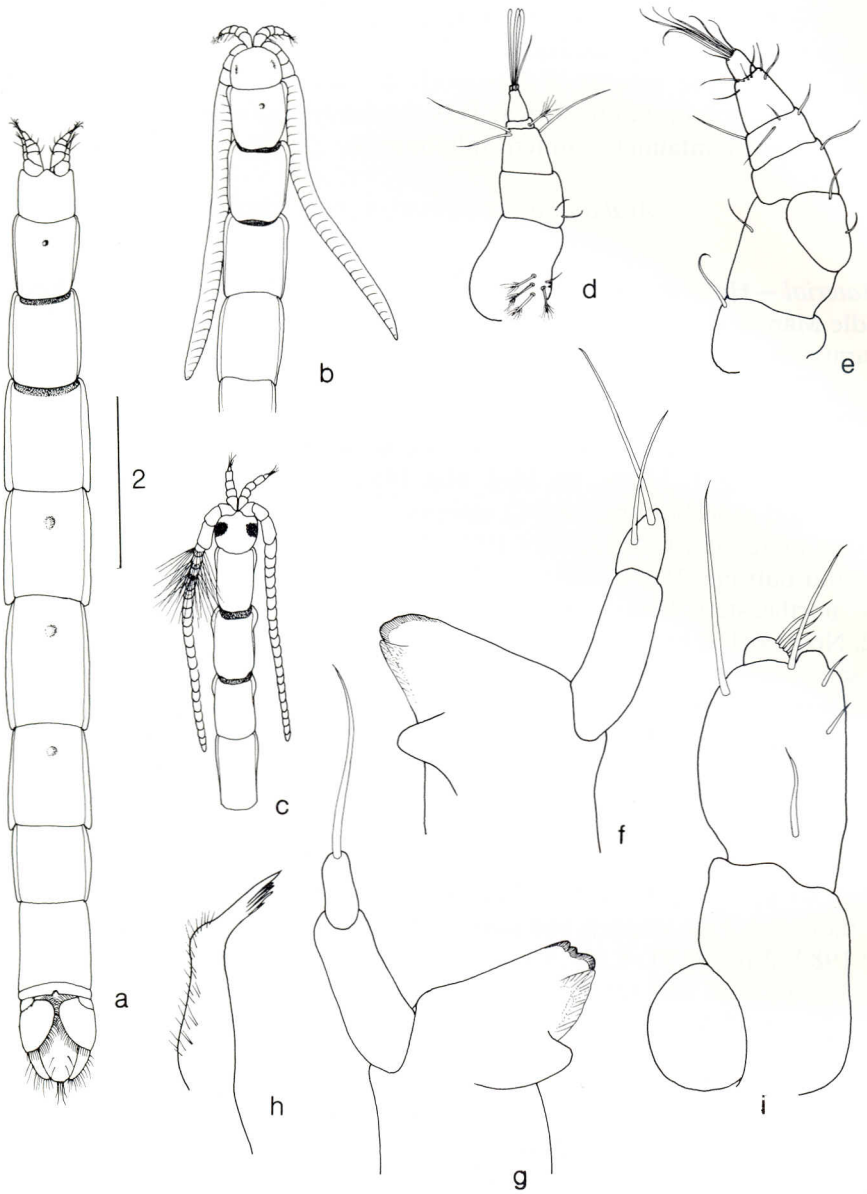

Fig. 1. *Arabanthura enigmatica*: a, Ovigerous female in dorsal view; b, Head and anterior pereonites of premale; c, Head and anterior pereonites of male; d, Antenna 1 ♀; e, Antenna 2; f, Right mandible ♀; g, Left mandible ♀; h, Maxilla; i, Maxilliped ♀.

dentata broad-based, triangular, lacking marginal teeth; molar low, rounded (Figs. 1f, g). Maxilla with 1 strong and 4 smaller apical spines (Fig. 1h). Maxilliped of 4 articles, terminal article small, set on distal margin of penultimate article, semicircular, bearing 4 setae; penultimate article with rounded mediodistal lobe, bearing 2 elongate distal setae (Fig. 1i). Pereopod 1 more robust than following per-

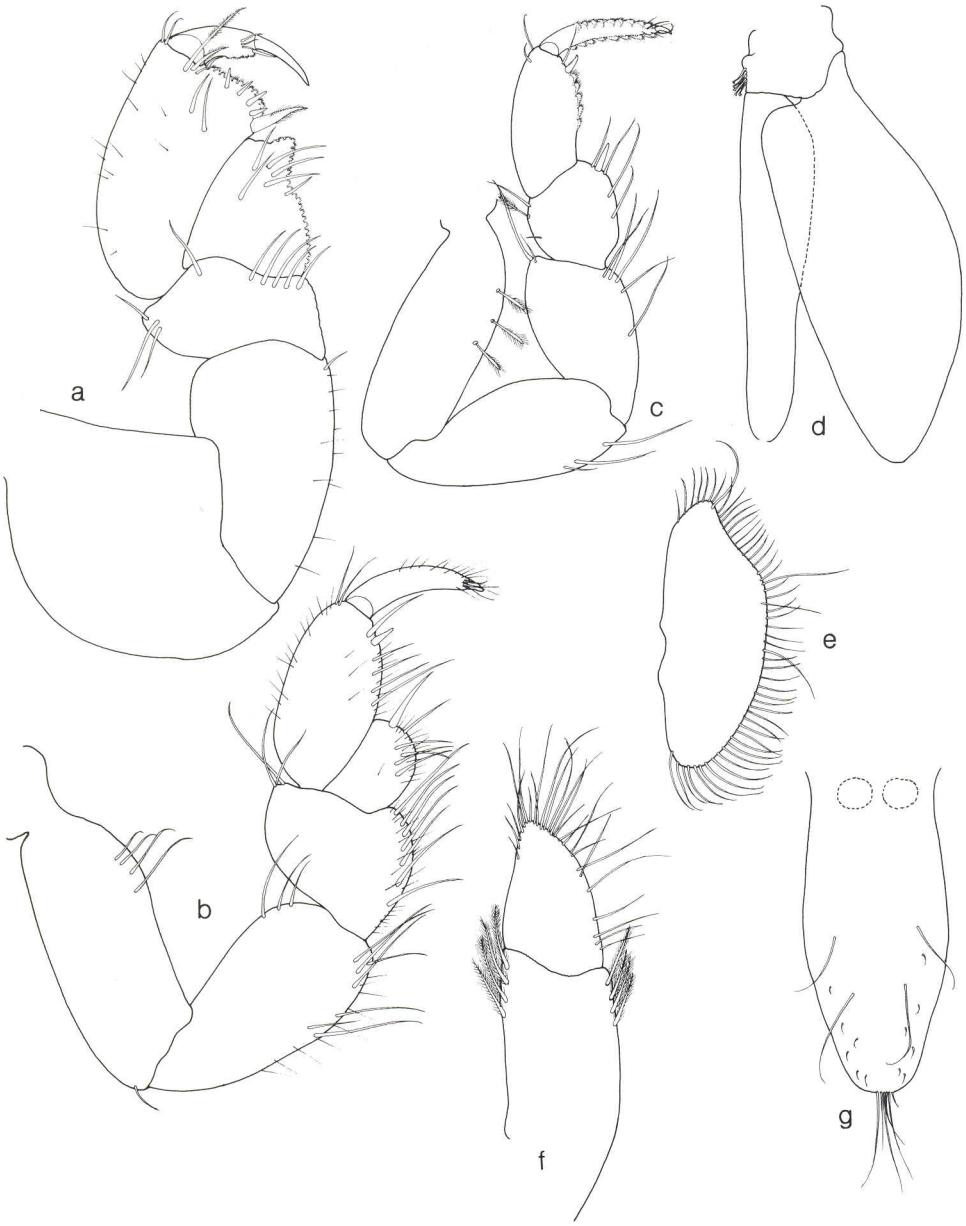

Fig. 2. *Arabanthura enigmatica* ♀: a, Pereopod 1; b, Pereopod 2; c, Pereopod 7; d, Pleopod 1; e, Uropodal exopod; f, Uropodal endopod and protopod; g, Telson.

eopods; merus with 5 submarginal distal setae; carpus with posterior margin bearing fringed scales, produced posterodistally into triangular lobe; propodus expanded, palm proximally convex, bearing fringed scales, 4 short submarginal spines on medial surface, strong fringed proximal spine; unguis equal in length to rest of dactylus (Fig. 2a). Pereopods 2 and 3 similar; ischia, meri, carpi, and

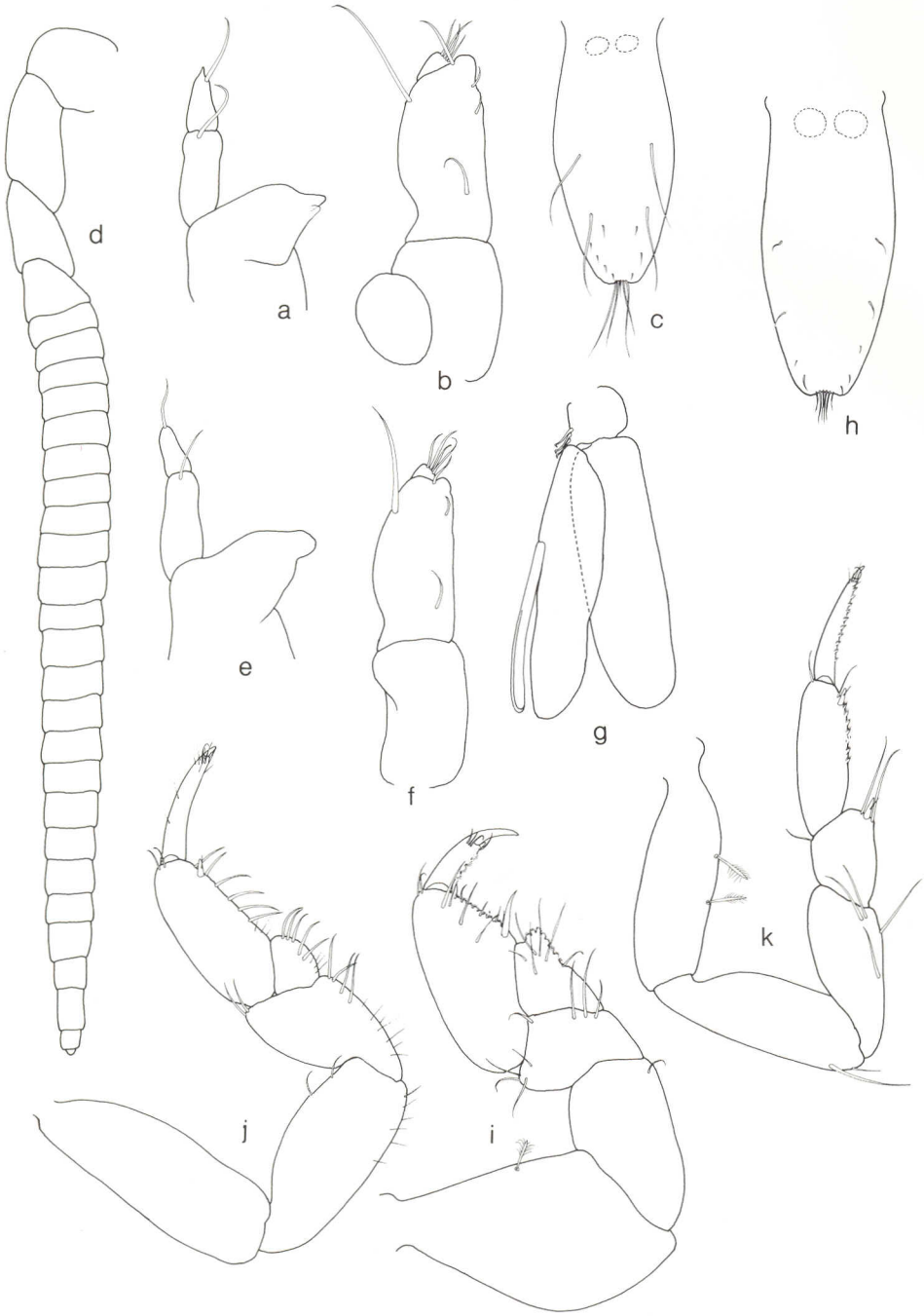

Fig. 3. *Arabanthura enigmatica*: a, Mandible, pre-♂; b, Maxilliped pre-♂; c, Telson pre-♂; d, Antenna 1, ♂; e, Mandible ♂; f, Maxilliped ♂; g, Pleopod 2 ♂; h, Telson ♂; i, Pereopod 1 ♂; j, Pereopod 2 ♂; k, Pereopod 7 ♂.

propodi bearing elongate setae on posterior margins; carpi with broadly convex posterior margins; propodi not expanded as in pereopod 1, with short serrate posterodistal spine; dactyli with very short unguis (Fig. 2b). Pereopods 4–7 with ischia, meri, and carpi each having 3–4 elongate setae on posterior margins; carpi with anterior margins free but shorter than posterior margins; propodi with fringed scales on posterior margins, and short serrate posterodistal spine; dactyli having fringed scales on anterior and posterior margins; unguis very short (Fig. 2c). Marsupium formed by 3 pairs of oostegites on pereonites 3–5. Pleopod 1, operculiform exopod subequal in length to, but more than twice wider than basal width of endopod; both rami bearing elongate plumose marginal setae (Fig. 2d). Uropodal exopod elongate-oval, with outer (dorsal) margin sinuous, margins having dense plumose setae (Fig. 2e); endopod triangular, reaching telsonic apex, with numerous distal setae; protopod having distal plumose setae on anterior and posterior margins (Fig. 2f).

Premale: Head with anterior margin convex. Faint subintegumental eye-pigment present. Antenna 1, flagellum reaching posteriorly to posterior margin of pereonite 4, articles incompletely indicated (Fig. 1b). Mandible with biarticulate palp, each article bearing single seta; incisor and lamina dentata reduced to nonsclerotized rounded lobes; molar absent (Fig. 3a). Maxilliped similar to female but penultimate article more elongate (Fig. 3b). Pereopods as in female.

Male: Head (Fig. 1c) with rounded rostrum; well-pigmented eyes, each of 20–22 ommatidia. Antenna 1, flagellum of 26 articles each bearing whorl of aesthetascs (Fig. 1c, 3a). Mandible with incisor and lamina dentata not differentiated; molar absent (Fig. 3e). Maxilliped as in premale (Fig. 3f). Pereopod 1, merus, carpus, and propodus less expanded than in female; merus with 3 submarginal distal setae; posterior margin of carpus smooth proximally, posterodistally produced into triangular lobe bearing fringed scales as in female; propodal palm very slightly convex, bearing strong smooth proximal spine and fringed scales as in female, otherwise only few setae on medial surface; unguis about $^{3}/_{5}$ length of dactylus (Fig. 3i). Pereopods 2 and 3 similar, more slender and bearing fewer setae than in female (Fig. 3j). Pereopods 4–7 also more slender and with fewer setae than in female; propodi and dactyli with fringed scales on posterior margins (Fig. 3k). Pleopod 2, endopod with copulatory stylet rod-shaped, not reaching beyond apex of ramus, articulating in proximal half of media margin (Fig. 3g). Telson dorsally less convex than, proportionally broader than, and with posterior setae less elongate than in female (Fig. 3h).

Remarks.—Two features of this species, neither of which have previously been reported in the Anthuridea, require comment.

1. The females lack eyes or eye-pigment, while the premales have subintegumental eye-pigment, and males have well pigmented eyes of numerous ommatidia. This feature, along with enormously elongate flagellum of antenna 1 in the male, would suggest that females are permanent members of the infauna, while males probably leave the sediments and swim in active search of mature females.

2. Combining the numbers of males, premales, ovigerous females, non-ovigerous females, juveniles, and mancas from all stations by collecting season (see following table) suggests that premales and males appear in March, and that the highest number of ovigerous females appears in April/May.

	♂	pre-♂	ovig. ♀	non-ovig. ♀	juvs	mancas
Nov 1981	—	—	—	9	17	—
Mar 1982	3	11	4	33	23	—
Apr/May 1982	—	—	14	4	2	40

This could be interpreted in two ways: Primary males appear in the population just prior to the production of eggs in the females (i.e., in time for fertilization) or, ovigerous females from the previous breeding season become males in time for the production of eggs in the following April/May. If protogynous hermaphroditism exists in this species, there would seem to be a progressive shortening of the total body length in the change from ovigerous female to premale to male, as borne out by the following dimensions:

18 ovig. ♀, TL 8.1–10.8 mm, (mean 9.1 mm, mode 9.0 mm)
11 pre-♂, TL 6.7–7.1 mm, (mean 6.8 mm, mode 7.0 mm)
3 ♂, TL 6.1–6.5 mm, (mean 6.2 mm, mode 6.1 mm)

This is contrary to the documented cases of anthurid protogyny, e.g., in *Cyathura polita* (Burbanck and Burbanck 1974), *C. carinata* (Wägele 1979), and *C. profunda* (Kensley 1982). The possible existence of primary males in anthuridean species presumed to be protogynic hermaphrodites has yet to be ruled out. The available data on *Arabanthura enigmatica* demand further investigation of the life-cycle, even though the sex ratio (4.4 ♀ to 1 ♂ or pre-♂) for all the samples combined would indicate protogyny.

Etymology.—The specific epithet refers to the puzzling feature of progressive body-length decrease noted above.

Acknowledgments

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