

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance.

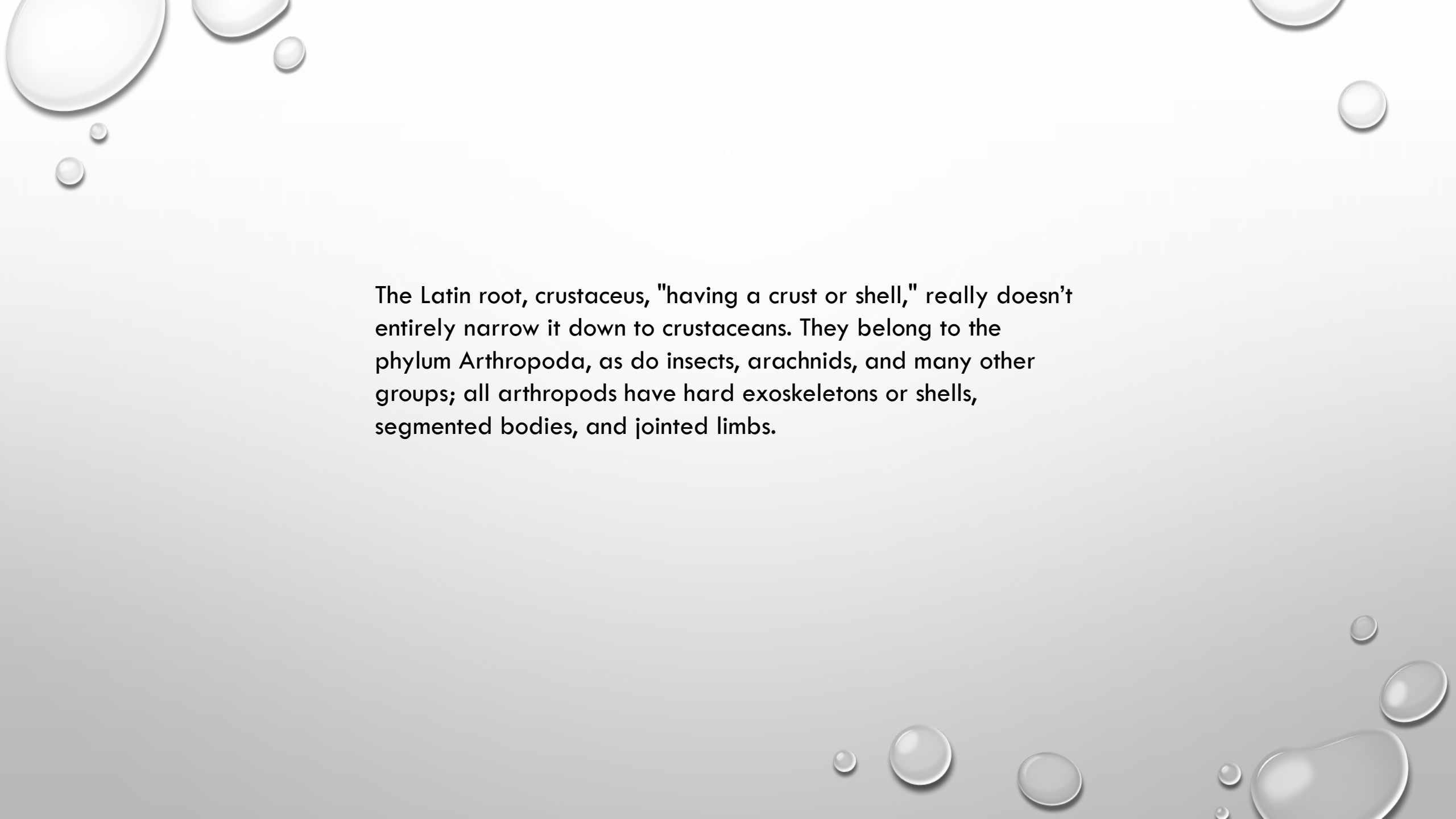
INTRODUCTION TO AQUATIC SCIENCES

4. Week Aquatic Crustacean

Introduction to Aquatic Sciences

WEEKLY TOPICS (CONTENT)

Week	Topics
1. Week	Aquaculture in Turkey and world
2. Week	The role of fish in human consumption
3. Week	What is fish? Taxonomy of fish
4. Week	Aquatic Crustacean
5. Week	Water quality for aquaculture
6. Week	Introduction to marine fish
7. Week	Introduction to freshwater fish
8. Week	Live foods (microalgae, zooplankton and <i>Artemia</i>)
9. Week	Introduction to fishing techniques
10. Week	Fish transport
11. Week	Introduction to fish disease
12. Week	Introduction to fisheries economy
13. Week	Processing and marketing of fish
14. Week	Introduction to fisheries and aquaculture management

The slide features a light gray background with a gradient. In the top-left and bottom-right corners, there are several realistic-looking water droplets of various sizes, some overlapping. The text is centered in the middle of the slide.

The Latin root, crustaceus, "having a crust or shell," really doesn't entirely narrow it down to crustaceans. They belong to the phylum Arthropoda, as do insects, arachnids, and many other groups; all arthropods have hard exoskeletons or shells, segmented bodies, and jointed limbs.

Crustaceans are usually distinguishable from the other arthropods in several important ways, chiefly:

Biramous appendages: Most crustaceans have appendages.

Larvae: Hatched larvae metamorphosis including; naupli, protozoa, mysis, postlarvae stages.

Eyes: In generaly occurs on stalk as stalkeyes.

Labrum: Anterior proportions of mouth coverage by labrum.

Head: It is divided by two parts; cephalic region located in anterior part and torax located in posterior part. The name of crustacean head is cephalotorax.

Teeth: on the mandibular gnathobase.

<https://education.eol.org/resources/topics/crustaceans.pdf>

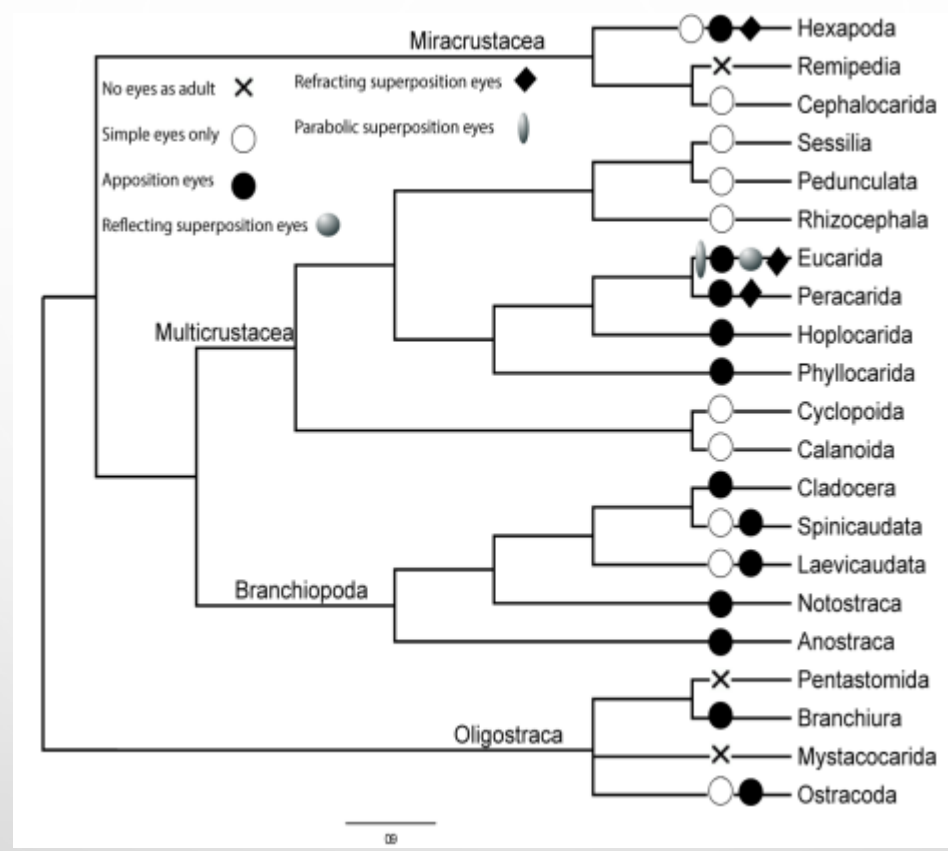
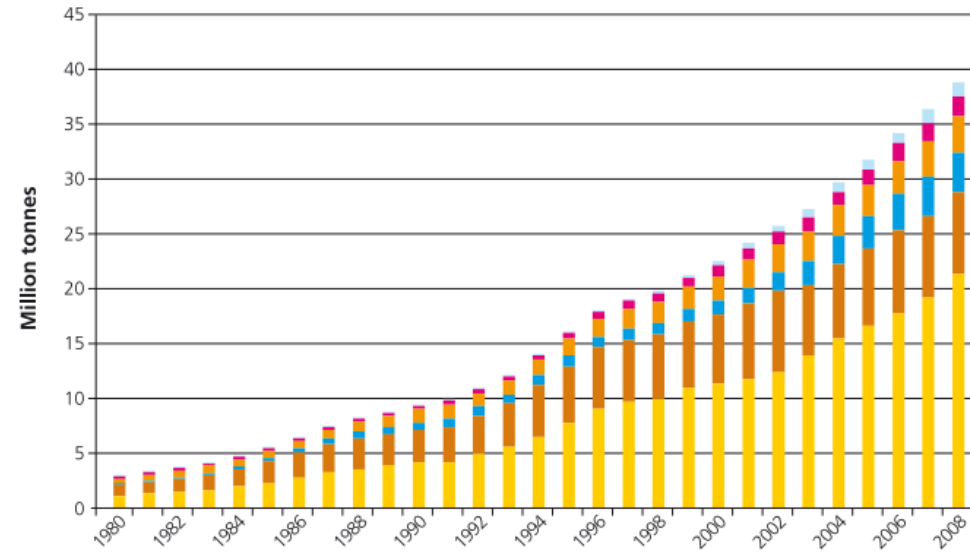


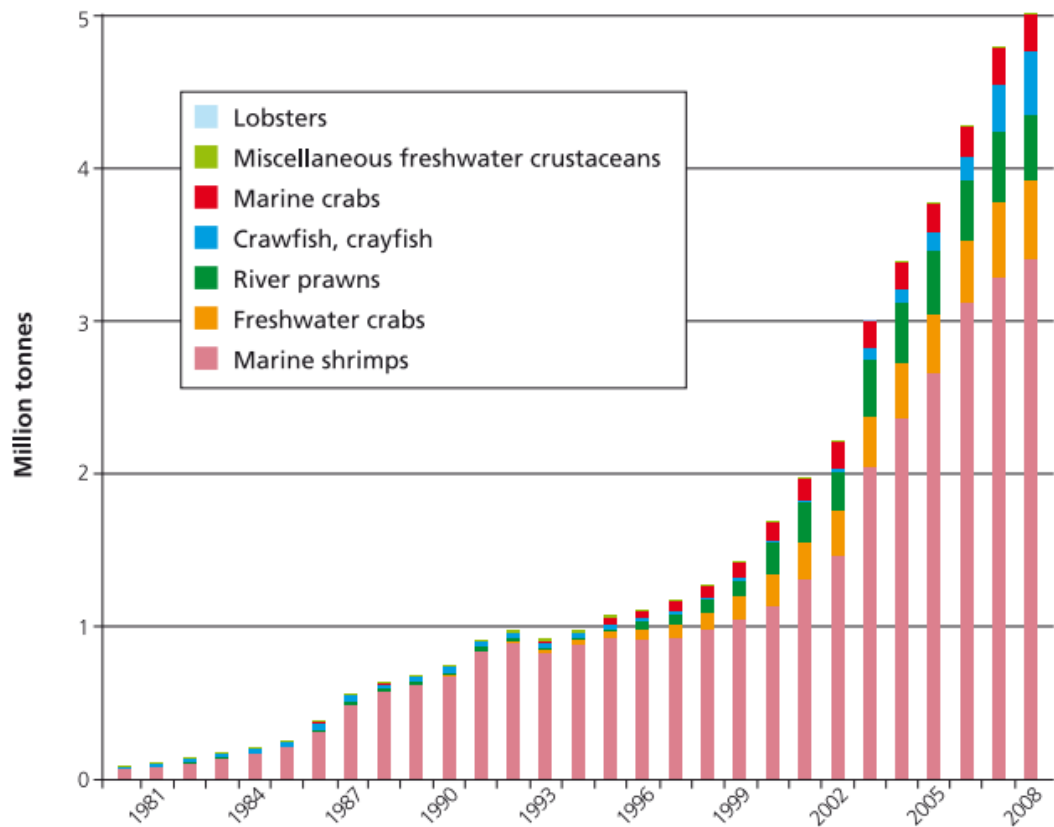
FIGURE 1
Total global production of fed fish and crustacean species
by major FAO species grouping, 1980–2008



GROWTH	APR (%/year)					Change (%)		
	80-85	85-90	90-95	95-00	00-05	05-06	06-07	07-08
Freshwater fishes: fed species	+14.9	+12.3	+13.5	+8.0	+7.9	+6.5	+8.5	+11.3
Freshwater fishes: non-fed species	+16.6	+8.2	+11.4	+3.7	+2.6	+7.5	-2.5	-1.0
Marine crustaceans: fed species	+24.4	+25.8	+7.3	+5.3	+17.8	+16.0	+5.9	+3.6
Diadromous fishes: fed species	+6.5	+12.4	+4.7	+8.2	+4.9	+4.7	+8.0	+2.2
Marine fishes: fed species	+4.0	+6.6	+11.5	+12.2	+8.1	+13.9	+5.8	+4.5
Freshwater crustaceans: fed species	+23.7	+12.2	+8.1	+32.7	+16.3	+4.5	+33.2	+7.7

Source: FAO (2010a).

FIGURE 3
Growth of fed crustacean species, 1980–2008



Source: FAO (2010a).

TABLE 1
Top 20 country producers of fed fish and crustacean species in 2008

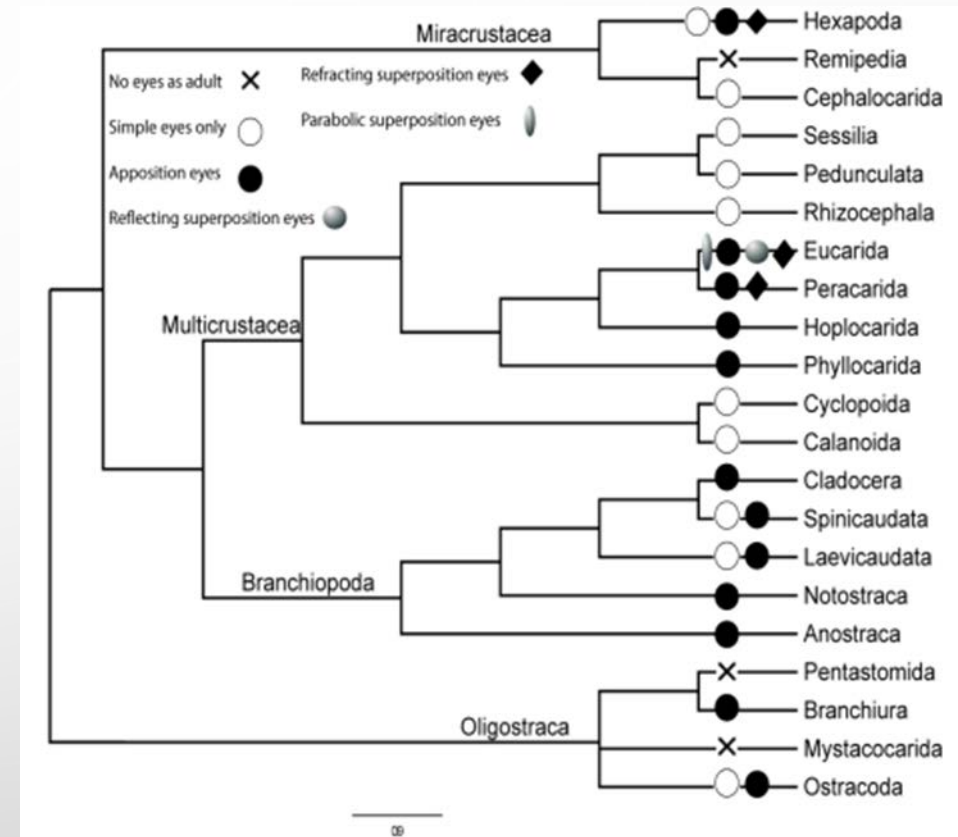
Country	Production (million tonnes)	Percent of total production
China	15.67	49.8
India	3.08	9.8
Viet Nam	2.12	6.7
Indonesia	1.64	5.2
Thailand	1.03	3.3
Norway	0.84	2.7
Philippines	0.70	2.2
Egypt	0.69	2.2
Myanmar	0.65	2.1
Chile	0.63	2.0
Bangladesh	0.62	2.0
United States	0.34	1.1
Japan	0.30	1.0
Brazil	0.27	0.8
Taiwan Province of China	0.22	-
Ecuador	0.17	-
Malaysia	0.17	-
Turkey	0.15	-
Mexico	0.14	-
United Kingdom	0.14	-

Source: FAO (2010a).

1.2 MODES OF SEX DETERMINATION

Sex determination in crustaceans could be categorized under the following four major types:

1. Genetic sex determination (GSD) with male heterogamety XY or Xo (male); XX (female) and female heterogamety ZZ (male); ZW (female)
2. Polygenic or polyfactorial sex determination
3. Environmental sex determination (ESD)
4. Cytoplasmic sex determination (CSD)



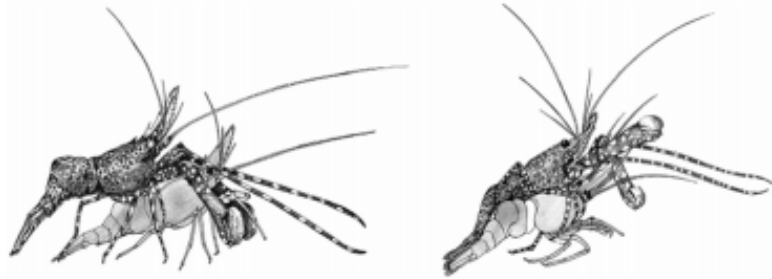


FIGURE 5.4 Caging position of dominant males on females during mating in *R. typus*. Reproduced from Correa, C., Baeza, J. A., Dupré, E., Hinojosa, I. A., Thiel, M., 2000. Mating behavior and fertilization success of three ontogenetic stages of male rock shrimp *Rhynchocinetes typus* (Decapoda: Caridea). *J. Crust. Biol.* 20, 628–640.

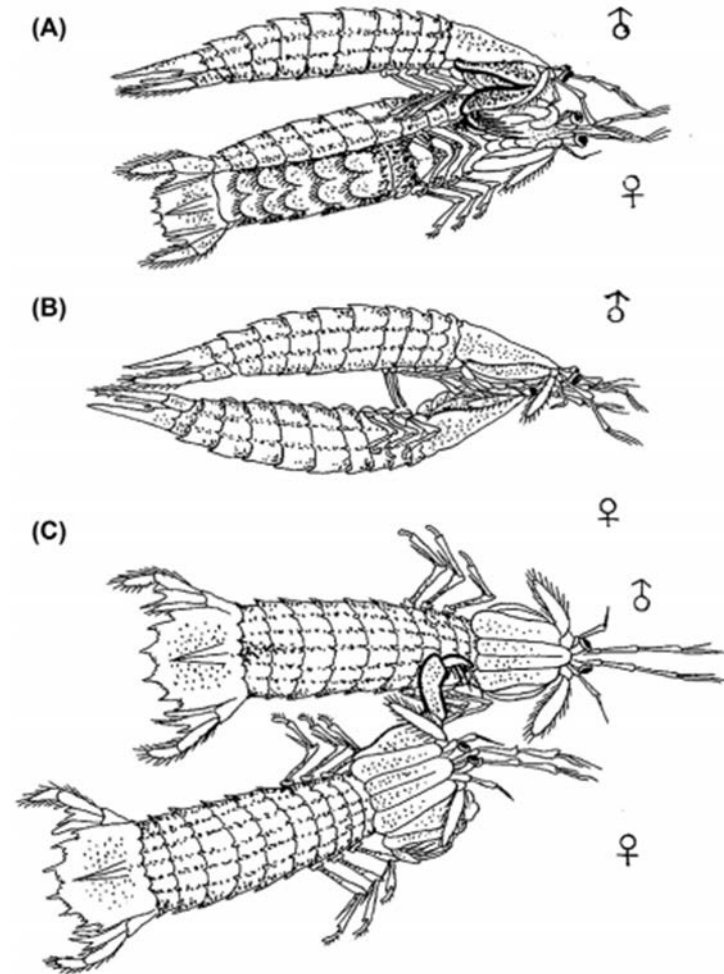


FIGURE 4.3 *Squilla holoschista*. Mating behavior. (A) Tilting posture of the female by the male; (B) male erection of paired intromittent organs; (C) final mating process during which the female strikes the male. Reproduced from Deecaraman, M., Subramoniam, T., 1983a. Mating and its effect on female reproductive physiology with special reference to the fate of male accessory sex gland secretion in the stomatopod *Squilla holoschista*. *Mar. Biol.* 77, 161–170.



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