The forewings are a rich purple with pale blue patches (at first glance these patches appear to have no scales). The hindwings are a rich purple with seven or eight gold spots around the outer margin. The under side is similar in colouration. Wing span is three and a half inches. The head is gold, thorax purple with gold centre and the abdomen purple and gold striped. The antennae are long and slender and naked. Body length about 1½ inches, stout and hairy.

During the middle of March I was fortunate enough to see, without exaggeration, hundreds of these insects gathered together. They were resting on the trees of Pseudomoious brunoniance, family urticaccae (nettles) I didn't need a net to capture any as they were also very thick upon the ground which was rather moist at the time. Two days later I was unable to locate one adult in this area.

The eggs are laid singly on the underside of the leaf and are white and flatish. The incubation period is about one week.

The adult insect flies with a fluttering motion.

Evelyn Corbet. 266. Sheridan St., Cairns.

My thanks must go to Mr. Stephens for botanical names supplied, Mr. Shaw for photography and the Australian Museum for identification of specimen.

SIPHONOPHORES

PART 1 OF A SERIES.

The phylum Cnidaria is divided into three classes, the Anthozoa, Scyphozoa, and Hydrozoa. Within the latter class lies the order Siphonophora, composed of free-swimming or floating colonies each consisting of several types of polypoid or medusoid members attached to a common stalk or disc.

The siphonophores normally inhabit that food-rich zone near the water surface, and are maintained there by special mechanisms. In the sub-order Calycophora the common stalk is supported by swimming bells (nectophores), which are modified medusoid structures. Calycophora are quite numerous in local waters but are rarely seen by casual observers because of their transparency and small size. Much more obvious are species of the sub-order Physophorida, in which bouyancy is achieved by the formation of gas filled chambers or floats (pneumatophores), which also represent a modified medusan bell. The (inverted) bell closes over to enclose a space into which gas is secreted by cells in its lining membrane. **Physalia** affords an extreme example of this mechanism.

The phylum Cnidaria is notable for its polymorphism, that is, the variety of form to be found in any one species. This is well demonstrated in the Siphonophora where, under a hand lens, the great diversity of form and the high degree of functional specialisation exhibited by the "individuals" of a colony can be readily seen, and one marvels at the potential of the primitive tissues from which they arise. For each such colony commences existence as a single individual which in the process of growth buds off other individuals, often of an entirely different structure and function. Perhaps it is confusing to speak of "individuals" in this sense, for in a colony all members are interconnected by a common nutritional system, are arranged in orderly patterns characteristic of the species, and may be so specialised in function that they are dependent on mutual relationships for survival. Some serve only for locomotion (nectophores and pneumatophores), others are concerned with the detection and capture of food (dactylozooids, tentaculozooids) or its ingestion (gastrozooids); some are purely protective (bracts or phyllozooids), while others again are reproductive members (gonozooids). Dactylozooids and gastrozooids are derived by modifications of the basically polypoid form.

Nectophores, pneumatophores, bracts and gonozooids can usually be linked to a medusoid origin. In some cases the one member may participate in more than one function, but is nevertheless dependent on other members for the part they play in the life of the colony. The assemblage forms a mutually beneficial and participating unit, and it is this unit which we recognise as a single 'specimen'.

PHYSALIA.

Physalia (figure 1) is the best known representative of the sub-class Physophorida, having a world wide distribution and fairly obvious physical characteristics. In addition it makes its presence known by inflicting painful stings. Its colouring is predominantly blue, though the upper margin of the float may show delicate shades of green or pink, and occasionally these colours extend to the whole exposed surface of the float. In the submerged members blue remains the basic colour, most intense at the attached ends of the polyps, often fading near the free ends, where it may be replaced with white or yellow tips.

The float (pneumatophore) is more than just a bag of air. It is a living muscular chamber secreting its own gaseous content (of slightly different composition from atmospheric air), having aerodynamic properties by virtue of its differentially curved surfaces, and capable of altering its shape under special circumstances — as in 'righting ship' after capsize, or in shifting bouyancy when the tentacle is attached to larger prey. The indented crest of the pneumatophore is strongly contractile, and it seems likely that sailing characteristics can be modified by muscular contraction. However the colony cannot deflate its sail, and is committed to its voyage irrespective of weather conditions. Persisting onshore winds lead to disaster, the colonies being cast up in thousands on beaches, or entangled in floating weed. There is however some provision for avoiding streams of floating material. The latter is driven directly before the wind, forming 'wind rows', whereas **Physalia** sails at a slight angle downwind. This course is determined by curvatures of the float, and the underwater resistance of the dependent members, which provide a keel and rudder mechanism. A further provision against mass extinction is the development of 'right hand' sailers and 'left hand' sailers. Figure 2 illustrates the variations in shape which accomplish this. One is the mirror image of the other. If the sailing angle of one batch results in destruction the others, sailing to the opposite side of the wind, may escape. It is not certain whether right and left sailers are produced in equal numbers in any given area, or whether a particular shape breeds true. It has been said that the different shapes represent adaptation to the different conditions in the Northern and Southern Hemispheres, but other workers deny this. Both right and left forms can be collected in this area.

Apart from mirror-image shapes, **Physalia** exists as two distinct species, the Atlantic form **P. physalis**, and the Pacific form **P. utriculus.** Without exception the many hundreds of specimens taken by me from north Queensland waters have been **P. utriculus,** and this is the species illustrated in Figure 1. It will be seen that there is but one major fishing tentacle, in contrast to the many major tentacles described for **P. physalis.**

In **P. utriculus** the major tentacles arises from an outsize polypoidal dactylozooid situated near centre of buoyancy on the under surface of the float. This tentacle may be as long as 20 feet when fully extended and even small specimens carry tentacles fifty to one hundred times as long as their floats. In addition to the main tentacle **P. utriculus** usually has a number of minor tentacles, of similar construction, but rarely exceeding a few inches in length. Figure 3 shows such a minor tentacle magnified to show details of its structure. The tentacle arises from near the base of a dactylozooid and consists of a muscular membrane thickened along one edge. At regular intervals along this thickened edge are bean-shaped protrusions or bosses covered with tiny spherical stinging capsules or nematocysts. These minute structures

function on contact with solid food, each discharging a fine tube which serves both as a harpoon and as a channel through which toxin can be injected into the victim.

When 'fishing' the tentacle hangs relaxed to about half its potential length, periodically shortening to bring captured food within reach of the lesser tentacles and the mouths of the gastrozooids.

Figure 6 shows three typical gastrozooids of **P. utriculus.** These are the 'stomachs' of the colony, and the only portals through which nutrition can enter. At the free (lower) end of each gastrozooid is an opening leading into a large cavity within the polyp and this cavity is lined with digestive and absorptive membrane. The mouth (which is also the anus) is under muscular control, as are the walls of the cavity, and both are capable of enormous expansion. Nutritive material too large to enter the cavity is not discarded—instead the mouth opens widely and the digestive lining pouts outward to be applied to the surface of the food. Thus quite large fish can be carried underneath the colony, and be digested by a multitude of extruded 'stomachs'. Nourishment obtained by the gastrozooids is distributed throughout the colony.

The structures illustrated in Figure 4 are small dactylozooids, perhaps having some sensory function, and certainly affording protection to more vital members. They may in addition have some value as storage tissues.

Figure 5 shows a cluster of reproductive elements arising from the familiar polypoid form—in this case a gonozooid. The stalk bearing the sexual 'fruits' (male and female gonophores) is referred to as a gonodendron; the large leafy fingers are protective gonopalpons. In large specimens from southern waters gonodendrons make up the major mass of submerged elements, and the more mature female gonophores may show distinctly medusoid characteristics. However specimens from the Cairns area are usually small, and apparently immature. Reproductive members may be hard to find on specimens less than one inch in float length. On larger specimens the gonozooids tend to be concentrated under the more bulbous of the two projections from the float, and may be recognised by their more subdued colouring and tangled appearance.

Despite the obstacle offered by the Barrier Reef, **P. utriculus** is not uncommon in waters near Cairns, but never attains the size and numbers so troublesome on the beaches of southern Queensland, and New South Wales. Tiny specimens with globular floats only a quarter inch in diameter are often seen in trinity Bay following strong south-east winds, and sometimes after northerly winds, though the latter tend to reveal larger specimens one to three inches in float length. Outsize **Physalia** are sometimes reported from waters off the northern coast of Australia, the floats being described as "big as footballs". As yet however no such specimen has been submitted for study.

J. H. BARNES.

(ILLUSTRATIONS ON PAGE 10.)

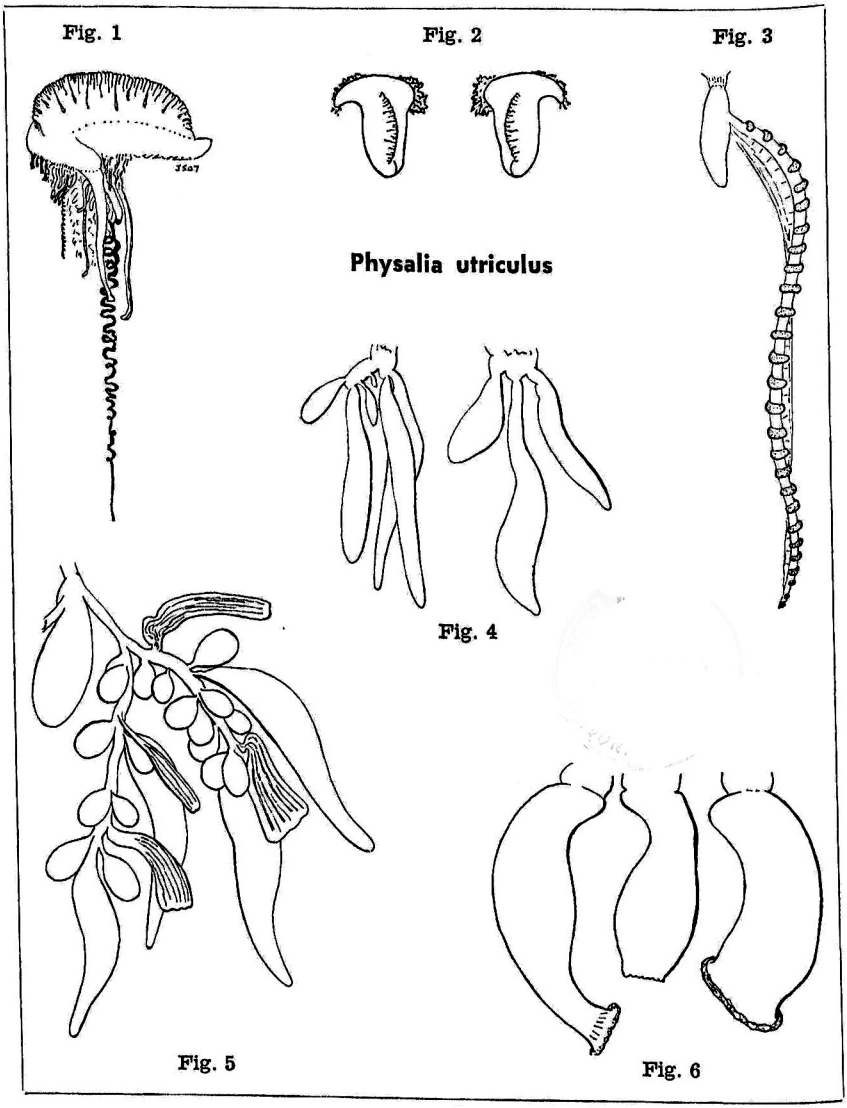

Fig. 1. **Physalia utriculus** La Martiniere, 1787, reproduced 1/3 actual size. Note the single major tentacle which distinguishes this species.

Fig. 2. Reversed (mirror image) shapes which diverge when sailing.

Fig. 3. Dactylozooid with minor tentacle — 5 times actual size.

Fig. 4. Dactylozooids — protective members of the colony. x 15.

Fig. 5. Gonozooid, with gonodendron, gonophores and gonopalpons. x 15.

Fig. 6. Gastrozooids — the mouths and stomachs of the colony. x 15.