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VOL. I. of the Journal of the Tasmanian Field Naturalists' Club was published in 1907, and was complete in three numbers. Owing to financial strain the Committee refrained from issuing any further numbers during 1908; but publishing has now re-commenced, and it is anticipated will be continued regularly, probably two numbers being issued annually.

The Club's Fourth Annual Meeting was held on the 10th September, 1908, in the Royal Society's Room, at the Museum—where the monthly meetings are now regularly held. At this meeting the Office-bearers of the previous session were unanimously re-elected.

The Annual Report, which was read and adopted on the motion of the Chairman, showed an increase in the membership of the Club to 110, and in the average attendance at the meetings of nearly 60; the attendance at the outings being also well maintained. Mention was made of the sojourn amongst us of Mr. Geoffrey W. Smith, B.A., Oxford, who visited Tasmania to study its Fresh-water Crustacea; a paper by Mr. Smith on his work appears in this issue. Mr. Robt. Hall, well known as an ardent lover of nature, is now amongst us, and, as Curator of the Tasmanian Museum, will be of great assistance. Our late chairman, Mr. S. Clemes, is on a visit to England, but we hope soon to welcome him back.

Two camps-out were held—at Bruni Island during November, and at Maria Island during Easter, both being most successful.

The annual balance-sheet showed a deficit of £3 os. 3d., due to the cost of printing being greater than the Committee anticipated.

The chairman, Mr. L. Rodway, gave a Presidential Address on 'The Family of Australian Heaths,' illustrating his remarks with specimens from his herbarium. This paper appears in this issue.

Casmanian Heaths.

By L. RODWAY.

HEATH is a popular name and means more or less according to the idea of the user. Some use it to denote any twiggy flowering plants that grow in moorland; others restrict it to the group commonly called Ericas. Botanists generally use it in this sense, with the reservation that they may, for convenience, extend it to the whole family to which the heaths belong. When they so extend it, they necessarily include many plants that do not accord with the popular idea of a heath. For instance, when a botanist calls an Azalea or a Grasstree a heath he generally raises on his audience a look of incredulity. He really means these plants belong to the same group as those commonly termed heaths. The heath family in its largest sense is well defined, large, and of almost worldwide distribution, but it is naturally divisible into two; each division is now treated as a distinct family. One, of which our garden Erica is the type, is of very wide distribution in Africa, Europe and North America; and has also a few representatives in other parts. We have four species of this family, the commonest being our pretty white cluster berry. Amongst the unheathlike member of this family, that may be found in our gardens, are Andromeda, Arbutus, Azalea, Kalmia and Rhododendron. A mark of the family is that there are twice as many stamens as there are lobes to the corolla, that is, they are usually ten, and their antlers are bilocular, and discharge their pollen through terminal pores or short openings. The other family, of which our common heath or Epacris is the type, bears stamens of the same number as the corolla lobes, and at maturity the antlers open by a single longitudinal slit. It is almost confined to Australia and adjacent regions. Few species extend to the Indian Archipelago in one direction, and one only to South America in the other; none is found in South Africa. We can, therefore, call this the family of Australian Heaths. It contains its unheathlike forms as in our Mountain Grasstree. In a typical member of this family the corolla is a tube ending in five lobes, and the stamens are joined to the petals. This has led to an erroneous placign of the family in proximity to Solanum, Convolvulus and such. We occasionally find species with the corolla evidently made up of separate petals, and the stamens inserted into the torus. This and other reasons indicate that, though heath, by its tubular corolla appears to belong to the division of plants with united petals, it is only an apparant relationship, not a real one. The more our study of flowers progress, the more difficult appears their classification. We can sort plants into groups or orders with tolerable certainty, but when we wish to go further we find we still have to be satisfied with an arbitrary arrangement.

The family of Australian heaths is divisible into two tribes characterised by a difference of fruit. In the first, of which Styphelia is used as the type, each carpel bears one ovule and the fruit has a fleshy

outer portion; in the other of which *Epacris* is typical each carpel develops many ovules, and the fruit has a thin dry wall. The *Styphelia* tribe is a very large one, and in order to handle it conveniently most botanists have divided it into genera most of which are founded upon small unimportant differences; others in an endeavour to maintain genera upon more natural lines do not recognize these artificial distinctions. In consequence of this we have two schemes in use in Australia, the former whose chief exponent was Robert Brown, is most in use in Tasmania, New South Wales, Queensland, and the West, the other with the powerful support of Von Mueller is in vogue in Victoria and South Australia. As the tendency all the world over is to split up large genera into smaller ones, even if the distinctions must be purely arbitrary, there is at least convenience in supporting Brown's classification.

In Tasmania we have members of ten genera of the *Styphelia* tribe.

Styphelia has relatively large flowers, the corolla often exceeding an inch in length. The lobes are about as long as the tube and are much recurved, they are clothed with rather long hairs on the upper surface. The stamens protrude considerably. The flowers are not numerous and are placed singly in the leaf axils, but there may be one or two rudiments of flowers under the bracts. The flower stalk is closely covered with bracts, progressively larger as they approach the calyx; the upper pair, termed bracteoles, closely overlap the sepals, which they resemble. The outer covering of the fruit is very thin, and in some cases reduced to a skin-like covering to the hard five chambered stone.

Astroloma has also the flowers single in the axils and the bracts are similarly arranged. The corolla tube is long, but the lobes are only shortly recurved at the tip, and the stamens do not protrude. The fruit is also similar, but is generally more fleshy.

Lissanthe. In this genus, as in most that follow, the flowers are small. Instead of being single they are clustered in the axils; each flower is in the axil of a single bract, and the two bracteoles closely overlap the calyx. The corolla lobes are short, spreading, and are only slightly hairy on the upper surface. The fruit is round, fleshy, with a five chambered stone.

Leucopogon is very similar to *Lissanthe*, but the upper surface of the corolla lobes is densely covered with white hairs. In rare instances the flower appears solitary, but even then there is at least one rudiment below it.

Cyathodes. The flowers are always solitary in the leaf axils, and their stalks clothed with bracts. The corolla may be hairy on the upper surface, but never as much so as in *Leucopogon*. The fruit is more fleshy but otherwise similar, but in our common Cheeseberry the stone is ten chambered.

Monotoca has very small flowers, generally clustered, rarely solitary; the corolla lobes are hairless. There is a single bract and two bracteoles, but the distinguishing mark of the genus is that the fruit has a single cavity, containing one seed.

Acrotriche. A small genus, with small greenish flowers in clusters, which, instead of being placed towards the ends of the branches, as in other genera, are developed far back. The corolla bears a tuft of hairs at the tip of each lobe, and five hairy scales at the throat. The fruit is as in *Lissanthe*.

Brachyloma has small solitary flowers, the stalks of which in Tasmanian specimens have no bracts, or very small ones beyond the two bracteoles. The lobes of the corolla are placed differently to those of the other genera, in the bud they are imbricate, that is, the margins of some overlap others, whereas in the others they are valvate, that is, meet one another, edge to edge. The upper surface of the lobes are in some species hairy, in others not, but there is always a ring of long hairs or fringed scales at the throat and reflected down the tube. The fruit is small, fleshy, with a five celled stone.

Pentachondra has small or medium sized flowers, the lobes are hairy on the upper surface and where at all long are reflexed as in *Styphelia*. The bracts are many, the upper one of which bears a rudimentary flower, otherwise they are solitary. The fruit is fleshy, but differs in containing five free, one seeded stones.

Trochocarpa, often also called *Decaspora*, bears small flowers in clusters, each in the axil of a bract. The corolla is hairless, or with tufts of reflexed hairs. The fruit is rather large, very fleshy, pale blue, and contains ten one seeded stones.

Of the *Epacris* tribe we have six genera.

Epacris. The flowers are solitary in the leaf axils, and their stalks are closely covered with persistent bracts. The corolla tube may be long and slender, or rather short. The stamens are usually included in the tube, but in one or two species they freely protude. The fruit is a dry, five-chambered capsule, with the style sunk in the centre. Ovules are numerous in each chamber, and arise from a small cushionlike placenta formed on the inner angle, that is towards the axis. This condition of fruit is common to the tribe; only in *Richea* and *Dracophyllum* the placenta is on the end of a short club, which arises from the axile angle.

Archeria is very close to *Epacris*. It differs in the flower being more grouped together, sometimes racemed; the bracts fall while the flower is yet young; the bracteoles are distant from the calyx, and the pit round; the style is much deeper.

Prionotes. There is but one species in Australia, and it is confined to South West Tasmania. It is a tall climber. Flowers are relatively large, often an inch long. Solitary in leaf axils the long slender stalk bears many minute bracts. The calyx is very small, the corolla tube long, with five small recurved lobes. The stamens are free from the corolla, and inserted into the torus. When young the antlers are bilocular, but they open by one longitudinal slit.

Sprengelia. Flowers are solitary in the leaf axils. Petals are united only at the extreme base. Stamens are inserted on the torus.

The leaves arise from a broad base, entirely sheathing the stem and taper to a point ; they do not leave scars on the stem.

Richea. The flowers are in clusters in the axils of leaf-like bracts. Corolla has only very minute lobes and is thrown off like a hood by splitting round near the base. In one of our rare forms, *R. milligani*, the corolla generally splits on one side and shrivels on the bush. The leaves are as in *Sprengelia*, but leave ringlike scars.

Dracophyllum differs from *Richea* practically only in the corollas being bell-shaped and persistent. One of our two species is dwarf and forms dense cushions indistinguishable from *Abrotanella* and *Donatia*. In this species the flower is solitary and terminal ; the other is very like our Giant Grass-tree, but does not attain such large proportions, and instead of the insignificant flowers of that plant it bears a terminal loose flower cluster of most beautiful little pendant, pinkish, white bells.

Notes on Tasmanian Crustacea.

By G. W. SMITH, M.A., OXFORD.

THE class Crustacea includes a very great number of animals, most of which live in the sea, but a very large number of them inhabit fresh-water lakes, ponds and streams, and it is of these that I intend chiefly to speak.

Probably the Crustacea that are best known to most of us are those which are seen in shop windows and sometimes find their way on to the dinner table ; such are the prawns and shrimps, and the large red cray-fish (*Panulirus*), which is also prized as a delicacy on the Mediterranean coasts, and is eaten there under the name of Langouste.

The fresh-water lobster of Tasmania is also very good to eat (*Astacopsis Franklinii*), and grows to a very large size in the rivers of northern and western Tasmania ; but in the rivers and creeks round Hobart the lobster appears always to remain small and insignificant, whether for lack of food or because it is a distinct smaller species, is not known for certain.

Fresh water lobsters are found pretty well all over the temperate regions of the world, but they are not found at all in the tropics. The Tasmanian lobster is closely related to those found in Australia, New Zealand, South America, and Madagascar—*i.e.*, in the temperate southern hemisphere ; and it is quite distinct from those which occur all round the north temperate zone in North America, Europe, and China.

This is a remarkable fact, because the land regions in the southern hemisphere are at the present time separated by very wide and deep oceans, across which the fresh water lobsters could not possibly ever

have crossed ; so that the present distribution of these lobsters informs us pretty certainly that at some rather remote period there must have been a continent somewhere in the antarctic seas connecting the southernmost parts of South America, New Zealand, Australia, and Madagascar together, and in this region the ancestors of all these southern lobsters must have lived.

The so-called land-crab of Tasmania which lives in deep burrows upon marshy plains in the mountains, especially near the west coast, is really a lobster, too, closely related to the *Astacopsis* ; its scientific name is *Engaeus fossor*. Curiously enough, some of the North American lobsters of the genus *Cambarus* have also taken to making burrows in the earth, and have quite forsaken their natural element of water.

The Crustacea we have hitherto mentioned, namely, shrimps, lobsters, crayfish, and crabs, although they differ from one another in many points, are really all built upon the same plan, and are made up of the same number of segments. If you look at a lobster or shrimp you will see that its hinder end or tail is composed of a number of rings or segments, to each of which is attached a pair of jointed limbs. The front part of the body or cephalothorax (*i.e.*, head-chest) does not show clearly this structure of ringing or segmentation, but the limbs attached to this part of the body indicate the number of segments out of which it is constructed.

Now in all the above-mentioned Crustacea there are 20 segments with their limbs, *i.e.*, two pairs of feelers or antennæ ; three pairs of jaws, which are used for biting the food, but are really modified limbs ; three pairs of auxiliary jaws or maxillipeds, which are half jaws and half legs ; five pairs of walking legs, some of which end in pincers ; and then follows the seven tail segments or rings, which carry seven pairs of swimming legs.

As before stated, the first thirteen segments of the body are all fused together to form a carapace or shell, so that there is no outward sign of segmentation except the limbs, and the front ones of these are so much drawn into the mouth to act as jaws that one can hardly believe that they correspond to limbs attached to regular segments as in the tail region.

Now it is the unique distinction of Tasmania (or was until the other day when a similar discovery was made in Victoria), to possess a very peculiar shrimp-like animal in which the body is segmented or ringed all the way down, and in which the limbs preserve their simple character of double-pronged oars right up into the region of the mouth.

It is clear that this animal (*Anaspides Tasmaniae*, Thomson) preserves the simple primitive plan—the diagrammatic form as it were—upon which the higher Crustacea are built, and everything we can learn about its structure and habits is of great interest. It appears to live only in mountain streams and clear tarns at a great elevation, the locali-

ties for its occurrence being the top of Mount Wellington, the Hartz Mountains, and Mount Field. A figure of the animal's appearance is given here.

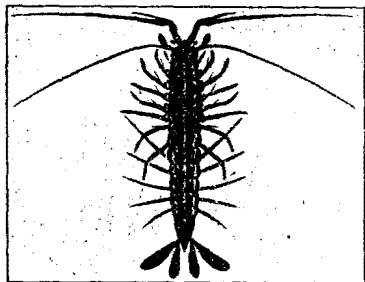


Fig. 1.—ANASPIDES TASMANIÆ.

The two pronged or biramous character of the limbs is especially to be noted, as this is characteristic of the young stages in growth of almost all Crustacea, and its being retained here in the adult is another primitive or ancestral feature. Another character of the mountain shrimp is that instead of the female carrying about her eggs with her as in all other Crustacea, she hides them under stones and in the roots of water plants.

We have so far only spoken of the higher Crustacea in which the body is always composed of twenty segments. These are called Malacostraca. There are besides a host of small Crustacea in which the body is not composed of any constant number of segments but may be less or more than twenty according to the species under consideration. These Crustacea are classed together as Entomostraca.

Probably the most familiar of these are the Barnacles, the little sharp shells attached to rocks at tide marks. Each of these little boxes really contains a live Crustacean, which, when he is covered with water, pokes out his legs and sweeps particles of food into his mouth.

Besides the Barnacles or Cirripeds there is a great number of small Crustacea which swarm on the surface of the sea, and afford a very important article of food to the shoals of fishes and even to whales. These little Crustacea, each single one of which is not bigger than a pin's head, are often present in such enormous quantities that the sea may be coloured red with them and have the consistency of chocolate.

Some of these marine forms are highly phosphorescent and may give rise to the phosphorescent seas so much admired by travellers.

But besides swarming in the sea, there is often a great development of these creatures in fresh water lakes, and by drawing a tow net of silk gauze, with a bottle attached to the end of it, through the water, I have succeeded in collecting several kinds of Entomostraca in great numbers, both in the Hartz Lakes and in the Great Lake and Lake St. Clair. The water in the last named lake, being extremely deep and clear, afforded the richest variety of this perpetually floating life. On a bright sunny day it is necessary to sink the net to a considerable depth in the lake, since these creatures cannot bear the direct rays of the sun upon them.

But besides the large lakes in Tasmania the smallest ponds and puddles will be found to contain Entomostraca.

These are all varieties of the three types figured below; they never run to any great size but are always visible to the naked eye.

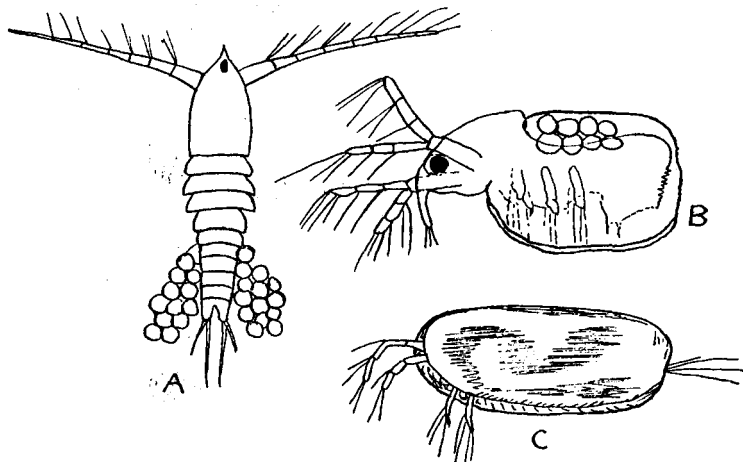


Fig. 2

A—Cyclops. B—Daphnia. C—Ostracode.

You may wonder how it is that these aquatic animals can survive and multiply in small pools which must frequently dry up in the heat of summer. The method by which this is effected in the Cladocera was discovered some years ago by the great German biologist and student of heredity, Professor Weisman. He found out that whilst favourable conditions prevail these animals were all female, which produced very rapidly eggs that did not require fertilisation in order to develop. But when unfavourable conditions arrived, such as extreme heat or cold, the females began to lay a different kind of egg, which had to be fertilized by the male, and which was afterwards encased in a little air-tight box made by the female out of her own shell.

The fertilized egg, so shut up, is now capable of being frozen or dried up, or blown about by the wind, indeed almost anything except burnt, and still when it falls into a favourable pond or puddle, after an interval of even several years, it will hatch out and give rise to another generation of water fleas.

Weisman also believed that the production of these 'resting' eggs was not directly called forth by the approach of danger, but that each different kind of water flea produced them at regular intervals mechanic-

ally, according to the kind of pond or lake it lived in—those kinds that inhabit small ponds, frequently liable to dry up, producing 'resting' eggs at more frequent intervals than those inhabiting large lakes. But to go fuller into that question would lead us into very deep waters, so deep that no Crustacea would be found in them but only abstract ideas and metaphysical speculations.

Mr. Smith has since sent us an account of his work in Tasmania which appeared in the proceedings of the Royal Society, from which Figs. 1 and 3 are taken; and also the following concerning *Paranaspides lacustris*: This type of a new genus of the Anaspididæ was found by

me in the Great Lake, on the central plateau of Tasmania, at an elevation of 3,700 feet. It inhabits the littoral zone of the lake, living among the rocks and water weeds, rather after the manner of a prawn. It is totally different in external appearance to *Anaspides*, being of a green transparent colour sparsely

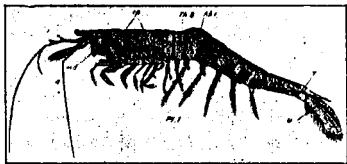


Fig. 3—*PARNASPIDES LACUSTRIS*.

powdered with black dots, and the body exhibits a marked dorsal flexure very much as in *Mysis*, to which it bears an extraordinary superficial resemblance. The largest specimen obtained was about an inch in length. It pursues a swimming habit, with which is correlated the flexure of the body, the elongation of the abdomen, the enlarged tail fan, and the enlarged scales on the second antennæ. The extremely abundant development of this Crustacean fauna in the littoral zone of the Great Lake was very striking, and it seems probable that it furnishes an important part of the food for the imported English brown trout, which in this lake may attain to the enormous weight of 25 lbs. A dissection of the stomachs of several trout revealed the fact that they had been feeding upon these creatures. The Anaspidacea and Phreatoicidæ of Southern Australia and Tasmania really stand in much the same relation to other Crustacea as the Monotremata do to normal mammals, and it is of interest to enquire whence these peculiar Crustacea have been derived, and how it comes about that they are now restricted to this isolated corner of the Antipodes. The most striking thing about their distribution at the present time is the fact that not only are they absolutely confined to the temperate parts of the Australasian region, but also to the coldest parts of the temperate zone, the majority of the Anaspidacea and Phreatoicidæ being found at considerable elevations on mountain ranges which are covered with snow for at any rate a great part of the winter. They are absolutely unknown from Australia north of the Dividing Range.

Notes on a Trip to the Straits Islands.

By W. N. ATKINS.

THE much-talked-of trip of the A.O.U., which I had the pleasure of accompanying, is now a thing of the past, and I am very sorry to say it was not the success that was expected, the weather being too rough to allow us to land on the islands where the best of the birds were breeding.

We left Melbourne at midnight on Tuesday, 24th November, in the 'Manawatu,' a small steamer of 112 tons, and reached the Heads at daylight on Wednesday, from there shaping our course to Westernport, where we were to land a little cargo and pick up a member of the excursion. Called at Flinders, Cowes (where we picked up Mr. Brooke Nichols) and San Remo, from the latter place steering a direct course to King Island, where we were to pick up Mr. Baker, another member of our mess, and where we arrived at 1 p.m. on Thursday after a stormy passage of 17 hours. Here we were weather bound till Saturday morning, and we filled in the time in various ways.

About half-a-dozen of us visited a small island in Currie Harbor, where the silver gulls were nesting, and our leader (Mr. Mattingley) obtained some good cinematograph pictures of the birds and their nests. As the nests were nearly all occupied by young birds very few eggs were taken.

At 5 a.m. on Saturday we got under weigh for Surprise Bay, at the south end of the island, where some of our party were in hopes of finding some bones of an extinct emu and various animals. We had great fun landing here, having to wade ashore through the surf and getting a good wetting. We stayed a few hours and got a number of bones, and after another wade through the surf and some excitement getting into the boat, we sailed for Albatross Island, which we hoped would prove to be our best collecting ground; but we were doomed to disappointment as we could not land on account of the rough weather, although we were in the vicinity for several days and could see the albatrosses quite distinctly, which made the disappointment keener. From here we went to Hummock Island to anchor for the night.

As it was blowing too hard next morning (Sunday) for us to leave our shelter, we decided to put the day in ashore, so took lunch and landed about 9 o'clock. Mr. Mellor (South Australia) visited a couple of mutton bird rookeries and obtained a few eggs, but beyond this had no success. One of the party obtained a clutch of eggs of the sooty crow shrike, which were laid on a bare rock.

On Monday morning at 9 a.m. we left for Penguin Island, where we expected to get among the pelicans, and eight of us succeeded in landing in rather a heavy surf; after Mr. Mattingley had obtained some pictures of the pelican rookery (which only contained eight nests) we had a good

hunt over the island, and found a few nests of Pacific gull just hatching. The ground was a perfect honeycomb with nests of mutton birds and penguins, and every step we took we went through almost up to our knees.

As we were short of bread and water it was decided to run into Devonport to obtain these, and we arrived there at 3 a.m. on Tuesday. At 1 p.m. we left for Waterhouse Island, where we were to shelter for the night, reaching there at 11 p.m. and leaving again at 4.15 a.m. next morning for Cape Barren Island; although we started in the calmest of weather, we soon ran into a severe gale, which upset most of us considerably, and after 5½ hours steam we were very glad indeed to get into calm water between Cape Barren and Long Island. A day was spent at the half caste settlement, and the school children were given a treat with sweets, cakes, dates, &c., which I am sure they will not soon forget, as we were informed by someone on the island that the children were almost living on shell fish (limpets) and pig face. As far as we could learn the male portion of the settlement is a very indolent lot, doing practically nothing towards getting a living, excepting the few weeks they are mutton-birding. Our next stopping-place was Kangaroo Island, where we landed one of our party (Captain Gilkison) and after a very short stay here left for the north of Flinders Island, where we landed a party for hunting, &c., who preferred to stay there, rather than face the rough trip expected on our run to Cat Island, where we hoped to find the gannets building. The Captain advised us strongly against this trip, but as we had so far had such poor success, we determined to try it, and after landing sufficient provisions to last the shore party several days, in case we could not get back, left for Cat Island, about 20 miles down the eastern shore of Flinders, where we arrived at 12.45 to find the landing perfect. We quickly got ashore, and I don't suppose any of us had ever seen such a sight, thousands of gannets (estimated at from 5000 to 7000) were nesting, covering about an acre of ground, the air also being thick with birds coming in with provisions. Here the cinematograph was again brought into operation, and a most beautiful lot of pictures obtained. We also found a considerable number of Pacific gulls nesting, and, of course, the usual mutton birds and penguins. After a good ramble round this small island, the boat took us across to Storehouse Island, a few hundred yards away, where some good pictures were obtained of a cormorant rookery, there being three rookeries on this island, one containing young birds, the second the full complement of eggs, and the third one egg apiece in each nest; we also found a small rookery of white-faced storm petrels here. We had only been on board again a very short time when the storm the Captain had been expecting came upon us, and as we were dragging our anchor he decided to run somewhere for shelter, and as it was dark we were not too pleased until we dropped anchor some hours later, under Babel Island, where we were fairly well protected. Next morning we were under way early for the shore camp, and after picking the party up we ran into Killisrankie Bay on Flinders Island, where we spent the remainder of the day.

On Sunday at 5.30 a.m. we left for the Kent Group, which we hoped would turn out a good collecting ground, but which really proved to be the worst spot we had visited, as far as bird life was concerned, even the mutton birds passing it by. However, we had a good day ashore on Deal Island, and were well treated by Captain Robinson, the lighthouse keeper, and family, whom I knew well years ago in Hobart

From here it was our intention to go to the Hogan Group, but as the weather was so bad we decided to run for the Mainland and get shelter as quickly as possible. During this run we were in the worst gale we experienced on the trip, the boat rolling in an alarming manner, but she proved herself a good sea boat and came up to her bearings every time. When nearing San Remo we were struck by a squall which the residents say was the worst experienced on that part of the coast for 30 years, and I only hope I am never in another like it. In this blow we lost a good deal of crockery, which we could hear smashing as the vessel rolled. We eventually reached San Remo at 7.30 p.m. and anchored for the night. During the night the wind and tide combined carried us on to a sand bank, and when we awoke in the morning were high and dry and able to walk ashore, which was a disappointing ending to our trip.

As there was no prospect of getting the boat off for a considerable time, most of us decided to catch a small steamer that was at San Remo and go to Melbourne, where we arrived in about seven hours

The members of the expedition numbered 25, three from South Australia, three from Tasmania, and the balance from Victoria; and a more sociable lot of people I never wish to meet.

On some Tasmanian Shells of Economic Value.

BY W. L. MAY.

TURBO UNDULATUS, *Martyn*. This shell is a member of the great Turbo family, which in the Tropics are represented by some very large and massive species, several of which are much used for cameo cuttings. It has a solid shell, ornamented by undulating bands of dark and light green and a solid shelly operculum; the species is widely distributed on our coasts and extends to Southern Australia. In New Zealand its place is taken by a similar but distinct species. Its station is at about low water mark, where it clusters together in numbers amongst crevices of rocks. It is frequently collected by sea-side residents for food and is in considerable esteem by them, and is known to fishermen and old residents by the name of 'Warrina,' no doubt an aboriginal name. It was a common article of diet with the blacks, as the numerous shells in their refuse heaps testify.

CANTHARADUS EXIMIUS, *Perry*. This the common 'kelp-shell' or 'marrina' of fishermen, is elongated in form, with a bright enamelled surface and an extremely varied colour pattern, from which circumstance,

and also its wide distribution, it has received many names. The species occurs over the whole coast line of Southern Australia, but is perhaps larger and more numerous in Tasmania; it lives attached to the leaves of the large floating kelp. The interior is brilliantly nacreous or pearly, and this is the case also with the outside when the outer enamel is removed by acid, in which condition they are manufactured into various trinkets. A smaller species, *C. IRISODONTES*, *Quoy*, has the same habitat and peculiarities, and is usually sold threaded in strings; they were used in this manner also by the blacks, which shows that in some respects we are as much advanced as they were.

PATELLA TRAMOSERICA, *Martyn*. This, our largest limpet, which may measure up to three inches across, is also widely distributed, but perhaps attains its largest size on our southern coasts. It was extensively taken by the blacks for food, but is now but little esteemed. The shell is occasionally used in the making of small objects, such as salt cellars, &c.

TRIGONIA MARGARITACEA, *Lamk*. This shell (the 'King cockle') and its varieties is confined to southern Australian seas, but is more plentiful in Southern Tasmania than elsewhere. It has been called a 'living fossil,' and is of great scientific interest, as being a living representative of a large number of fossil forms, upwards of 100 species of which are known. The genus was then very widely distributed in the world, many species being European. It is a most beautiful shell, the pearly interior being very brilliant, and is worked up into many ornaments and trinkets by jewellers, such as spoons, brooches, &c.

MYTILUS PLANULATUS, *Lamarck*. Our common edible mussel, appears always attached to stone or submerged wood; it was largely used as food by the blacks, and is in good demand for the same purpose at the present day. It is curious that very many mussels are inhabited by a small species of crab, which no doubt finds it a congenial home, although one would think it must be very *close* quarters. I suggest the relations between the crab and mussel would be worth investigation by members of this Club; small pearls are also found in these shells.

OSTREA ANGASI, *Sowerby*. The common edible or mud oyster, is the Southern representative of the European *O. edulis*, and is everywhere highly valued as a dainty luxury. In Tasmania it appears to be approaching extinction, many old beds having quite died out and others much reduced. Attempts at artificial culture have not so far been successful, one cause is probably the large quantity of mud washed into estuaries and bays since the cultivation of the land, but this would only have a partial application. In the days of the aborigines they were widely distributed, large and plentiful, as is witnessed by the enormous shell heaps on many parts of our coast-line. In its young state the baby oyster is free swimming, but soon becomes attached to some object, usually a shell or small stone, from which it never moves of its own accord.

* The Rev. T. Dove wrote—Tasm. Journ. Nat. Science I., 1842, p. 252. 'A cluster of glistening shells was termed a Merrina.'

The Dragonflies of Tasmania.*

By R. J. TILLYARD, M.A., F.E.S.

DRAGONFLIES, locally called horse-stingers, (though why is a mystery, since they possess no sting and are perfectly harmless) are found in all parts of the world, though they are most abundant and beautiful in tropical countries, such as New Guinea, Brazil, and India. Upwards of 2,500 species are known. England has 43 species, Europe 160, and Australia about the same number. The early stages are passed in fresh water, the female either dropping the eggs into the water during flight, or placing them carefully, by means of a sharp ovipositor, inside the tissues of water-plants. The larva, or nymph, as it is sometimes called, is a most peculiar creature, and varies much in shape and size, according to the family to which it belongs. It is distinguished from all other insect larvae by having the labium or underlip formed into a huge mask covering nearly the whole face. This mask possesses a joint like an elbow, and the insect can shoot it out a considerable distance, using it like an arm, in order to seize its prey. It feeds on smaller aquatic insects, and is particularly fond of mosquito larvae. The larger and more voracious kinds will eat tadpoles and small fish, and are often cannibalistic. There is no true pupal stage, the wings developing gradually from a fold in the thorax. When full-fed, the nymph crawls out of the water and undergoes a very rapid transformation, which has been briefly but beautifully described by Tennyson in one of his poems. It is well worth anybody's trouble to keep and feed a few nymphs for the sake of witnessing this remarkable event. In the course of a few minutes the wings grow from shapeless bags of fluid to their full size and beauty, and after a few hour's rest the insect is ready to launch itself into the air.

Practically nothing is known of the Dragonflies of Tasmania. A few unnamed specimens in Hobart and Launceston were the only evidence I had to go upon on arrival in the island a few weeks back. As a result of collecting in a fair number of localities during a particularly dry (and therefore unfavourable) summer, I have been able to list eighteen species, nearly all of which are common on the mainland round Adelaide, Melbourne and Sydney. As far as I know, only one species, *Synthemis Leachi*, is peculiar to Tasmania. It is a medium-sized fly with slender brown body marked with yellow spots. It is not common, but might be found hovering over any small permanent marsh or bog. Another rare species is *Somatochlora Jacksoniensis*, with a thicker body, and a brilliant metallic green forehead, the general colouring being dark bronze and orange. This might be found flying swiftly over large lagoons. Two lovely red species with short thick bodies—*Diplacodes*

* Mr. Tillyard will be glad to name any specimens that may be sent to him for examination. His address is Grammar School, Sydney.

nigrescens and *Nannodythemis Dalei*—are very rare; the former is about 2 inches, the latter 1 inch across the wings. Of the very large species, *Aeschna brevistyla* is common. It is a fine insect, brown, with green stripes and spots, and is over 4 inches across the wings. *Austroaeschna multipunctata* is slightly smaller and more graceful, but black with brown spots. It is common at Zeehan, and should occur in all mountainous country. Of the smaller species (*Agrionidae*) often called 'damselflies,' one cannot fail to notice the two common but exceedingly beautiful species of *Ischnura*. *I. heterosticta* being bronze with blue spots behind the eyes, blue thorax and blue tip, while the tiny *I. delicata* has a red body with a blue tip. Four species of *Lestes* occur, slender blue insects with forcipate appendages, of which *L. annulosus* is perhaps the commonest. It is blue with a series of sharply pointed bronze markings on its body.

In conclusion, I cannot recommend the vicinity of either Hobart or Launceston as a good collecting ground. Anyone desirous of making a fine catch of these beautiful insects could scarcely do better than seek some large permanent swamp, such as Lake Tiberias, and, given a warm sunny day as near midsummer as possible, he can scarcely fail to see these insects in swarms—catching them is not quite so easy! No doubt also the West Coast, with its great rainfall, would yield abundantly to the collector, and it is in that district that one might hope to find new species, if any such still exist.

Notes on a Trip to Moulting Lagoon, East Coast of Tasmania.

By A. L. BUTLER.

ON Tuesday, the 12th November, 1907, my friend, Mr. Malcolm Harrison, and I started per Ss. 'Waldemar' for a trip to Moulting Lagoon, East Coast of Tasmania, for the purpose of observing the nesting habits of the Black Swan (*Chenopsis atrata*), and also of inspecting the numerous lagoons and marshes in the neighbourhood for any of the Rallidae family; as we had been informed that several different species had been seen there at different times, and we also had hopes of finding the nesting haunts of the various Crakes.

On the trip down the usual sea birds were noted but nothing of special importance was chronicled, and we arrived at Swansea at 10 p.m. after a rather rough trip, very glad to have a good supper and a comfortable bed. We were up betimes next morning, and, after making some enquiries, we finally arranged to drive out to Gala, the then residence of Mr. William Calvert, who had kindly arranged lodgings for us with his shepherd, Mr. Radford, at Apslawn House. After lunch we went for a

stroll down by one of the backwaters on Gala, and there found our first nest, that of the Yellow-rumped Tit (*Acanthiza chrysorrhoa*) with the usual complement of three white eggs. This was soon followed up by finding a nest of the Native Hen (*Tribonyx mortieri*) from which the young birds scrambled out as soon as we caught sight of them. This was rather disconcerting as it pointed to the conclusion that, as to these birds at any rate, we were rather late in the season.

After spending some time on the marshes with only slight success, we arrived at a point where the salt water of Moulting Lagoon met the fresh water coming from the marshes, and a bright look-out was kept for Rails, and our expectations in this respect were to some extent fulfilled, as on wading out some ten or fifteen yards from the shore to a small patch of reeds, I disturbed a Lewin's Water Rail (*Hypotaenidia brachypus*), who was quite as interested in me as I was in him, and came up to me and stood for over half a minute within three feet, all the time giving vent to a sharp croaking noise. I spent a considerable time searching for his nest, but owing to the immense size of the marsh here, and number of likely places, failed to find any trace of it. The only nests found during the time I was searching for the Rail's were a *Malurus*' with two eggs, and several native hens which had lately contained eggs and young. We now made our way to the more open water of the lagoon, and whilst we discussed our lunch we watched large numbers of swans, both young and old, as they disported themselves on the broad waters of the bay. We were also much interested in a small body of pelicans, consisting of twelve or fourteen full-grown birds, one of which flew across the bay and settled within a quarter of a mile of where we were seated, which gave us a splendid opportunity of observing him through the glasses. We also saw several swans' nests, one of which had a swan sitting on it. This raised our hopes of being able to get a photo of the nest and eggs of this fine bird, but as the nest was somewhat over half a mile out in the bay we decided to leave this task till we could get a boat which we had arranged for the next day but one. After lunch we looked through some reeds, where we found several nests of the little grass bird (*Meglaurus gramineus*), but as they were only normal we did not disturb them. We then wended our way on to a small elevation, from where we could get an extended view of the bay, and from there a sight met our gaze which neither of us had ever dreamed of. As far as the eye could reach there were swans in countless numbers, which we afterwards estimated to be between eight and ten thousand. On our return journey we saw two hawk's nests, one of which contained young birds, but as we did not see the old birds we could not identify them. We also found a nest of Miner (*Manorhina garrula*) containing three rather fine eggs, of which a photo was taken, but, alas, the plate was broken in travelling. Nests of the Wood Swallow (*Artamus sordidus*) were found; one containing two young and one egg, and the other containing five eggs, which is a record as far as my experience goes of these birds.

The next two days were employed in searching the marshes for Rails and other wading birds, but with small success; a photo being

taken of a nest of a Native Hen which gave a fair result. On the following day we went round to the other end of Moulting Lagoon for the purpose of getting a boat, and so taking some photos of the swans' nests which we had located on our previous visits to the lagoon. We found our boatman waiting for us, but were very disappointed when he informed us that he did not think we should find eggs in any of the swans' nests which we had located, as, owing to a heavy south-westerly gale a week before our arrival, most of the nests had been overturned and the eggs sunk in the waters of the lagoon; and this we found to be, unfortunately, true, and we did not succeed in getting a single nest with eggs in it. But despite our misfortune in this respect we were amply repaid for any trouble we had taken by the sight of the thousands of swans which were congregated on that sheet of water, for when the boat was suddenly rowed out from behind a sheltering point of land thousands of swans rose into the air. The noise of their wings beating the water was something to be remembered, and the sight of a line of swans more than twenty deep, and which took over seven minutes to pass the boat, was one which must be seen to be realized. One of the reasons why we took this trip was for the purpose of ascertaining if the annual shooting which takes place at this lagoon was endangering the existence of this noble bird, and if it was at all likely to exterminate it. In my opinion it would not do more than equalise matters, and would certainly not kill more than the number of young swans which are annually reared.

Botanical Note.

L. Rodway reports the finding of the rare little Tasmanian fern, *Hymenophyllum marginatum*, H. et G. on top of Mount Wellington, where it grows amongst hepatics in the crevices of boulders of diabase.

Game Protection.

APPPOINTMENT of Game Commissioners. The Club took an active part in a movement during 1908 to appoint Game Commissioners to carry out the provisions of the Game Protection Act. On 28th September a large deputation waited upon the Premier, when a sympathetic reply was given and a request made for a Draft Bill, which was duly prepared by a committee and submitted to the Government, but the session closed without the Bill being presented to Parliament. As this is a most important matter it should not be left at this point, but brought up again at the first opportunity.

Black Swans on the Derwent. A letter was forwarded by the Club to the Attorney-General, asking for the protection of the black swans at

present on the River Derwent during the shooting season commencing on 1st February. These birds have been on the river for 18 months, and if left unmolested would perhaps remain permanently and breed. It is therefore a pleasure to record that a proclamation has been made giving the desired protection to these fine birds.

Cat Island (Bass Strait), Reserved. A letter was received on the 29th January from the Australian Ornithologists' Union asking for co-operation in having Cat Island (Flinders' Group) reserved as a sanctuary for sea birds, and accordingly a letter was forwarded to the Hon. Premier supporting the action of the A.O.U. Intimation has now been received that the Cabinet have had the matter under careful consideration, and concur that immediate action should be taken. The Lands Department have been communicated with in order that steps might be taken to give effect to the decision of Ministers.

Freycinet Peninsula, East Coast. Although reserved by law as a game reserve no bailiff has yet been appointed on this peninsula. The Club has often striven for such an appointment to be made, and as the Easter Camp-out will be held here in 1909 a good opportunity will then be made for bringing up the matter again.

Camp-out.

THE Easter Camp-out will be held on the East Coast this year, the excellent passenger steamer *Mongana* having been chartered for the trip. The main party will probably have their head-quarters on Schouten Island, but a sub-camp will also be formed on Moulting Lagoon. It is expected that the camp will be an extensive one, and naturalists from the mainland will be invited to co-operate. Arrangements are being made for lady members to take part.

Publications Received.

WE have much pleasure in acknowledging the receipt of the following publications, which are received in exchange for the 'Tasmanian Naturalist':—

- 'Records of the Australian Museum, Sydney.'
- 'Proceedings of the Royal Society of Queensland.'
- 'Publications of the National Herbarium, Melbourne.'
- 'Year-Book of the Smithsonian Institution.'
- 'Bulletins from Biological Survey, U.S. Department of Agriculture.'
- 'Year-Book, Depart. Agriculture, New Zealand.'

'Victorian Naturalist.'

'Australian Naturalist.'

'Queensland Naturalist.'

Any member of the Club desiring any of the above may obtain same upon application to the Secretary.

Printing Fund.

THE following are the names of members who have kindly subscribed to the Printing Fund; we shall be glad to acknowledge further donators:—W. N. Atkins, F. L. Brownell, A. L. Butler, S. Clemes, J. V. Cook, H. Stuart Dove, Chas N. Hope, A. M. Lea, Miss M. Lodder, L. Rodway, R. Stops, W. T. Todd, H. Watson. The total amount received being £4 17s 6d.

Exchange Notice.

WANTED:—Coleoptera, shells, birds' eggs, and stamps in exchange for coleoptera, shells, and stamps of the United States. Correspondence solicited. Everett R. Ryan, Box 33, Stilesville, Ind., U.S.A.—[Advt.]

