

...Journal...

of the

**West Australian
Natural History Society**

with which is incorporated

The Mueller Botanic Society.

No. IV.—November, 1907.

Perth :

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West Australian Natural History Society.

(With which is incorporated the Mueller Botanic Society.)

No. 4.—NOVEMBER, 1907.

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The West Australian Natural History Society.

REPORT FOR THE YEAR 1906-7.

LADIES AND GENTLEMEN,

Your Council has much pleasure in submitting the Annual Report and Statement of Receipts and Expenditure for the year ending the 30th June, 1907.

We began the year with a Credit Balance of £127 os. 11d. The actual Receipts amount to £44 8s., which includes the Government Grant for 1906. The Expenditure amounts to £77 6s. od., leaving a Credit Balance of £94 2s. 11d.

The number of Members is at present 59, of whom 10 are honorary. This is less than the preceding year by 21. The decrease is due to resignations and removals, for non-payment of subscriptions; and no new members have been admitted during the year. It is earnestly hoped that every effort will be made by members to induce friends to join.

It is to be regretted that the Government Grant of £75 has been cut down to £15, which greatly affects the working of the Society.

During the year just closed the Council has met seven times and the Society has held seven meetings, and papers on the following subjects have been read:—

“Some Parasites of the Blood,” by Dr. Cleland.

“The Australian Marsupial Mole, *Notoryctes typhlops*,” by Mr. C. P. Conigrave.

“The Pollination of the *Caladenia Barbarossæ*,” by Mr. O. H. Sargent.

“The Reserves for the Protection of the Native Fauna and Flora in Australia,” by Mr. Bernard H. Woodward.

A Field Excursion took place on Thursday, the 13th September, 1906, the members proceeding by the "Silver Star" to Canning Bridge, thence across country to South Perth.

A Field Excursion was held to Smith's Mill on Saturday, 17th November, 1906, to search for "Peripatus."

Efforts are being made to induce the Government to vest the Fauna Flora Reserves in Trustees.

Owing to the Secretary, Mr. F. Dobbie, resigning his position, Mr. G. P. Morison was appointed to act in his place till the next annual meeting.

In December, Messrs. B. H. Woodward, A. Gibb Maitland, and Dr. Cleland were authorised to convey an invitation to the Australasian Association for the Advancement of Science at the meeting in Adelaide, to hold their early meeting in Western Australia. Mr. Woodward, on his return, reported to the members that it will be impossible to hold a meeting in Perth before 1914, as the Council of the A.A.A.S. have arranged for meetings up to that date. A number of the Journal will shortly be issued.

G. P. MORISON, SECRETARY.

16th July, 1907.

THE POLLINATION OF CALADENIA BARBAROSSAE.

BY OSWALD H. SARGENT.

(Read before the W.A. Natural History Society, 28th May, 1907.)

The curious and beautiful Orchid known as *Caladenia Barbarossae* grows in the bed of the Avon River. This "river" is merely a series of pools during the greater part of the year. The larger permanent pools occupy the whole of the river-bed; but in many places the river widens considerably, and its bed is occupied by a number of small pools, which often dry up before the end of summer. Dense thickets of Ti-tree (*Melaleuca raphiophylla*) occupy the loamy soil beside and between these pools. Eucalypts (*E. rudis* and *E. rostrata*) are also plentiful. Here and there in sun-lit glades, shaded by the surrounding trees during a large part of the day, a humbler vegetation flourishes. In such places, sometimes amongst tallish grass, sometimes in company with *Ophioglossum vulgatum* and various other short-stemmed plants, *Caladenia Barbarossae* is to be found. Now in winter the river usually floods the land where this orchid grows. The growing plants are sometimes under water for several weeks at a stretch. This does not harm them; it may be beneficial; but several have grown and flowered well in sand in my garden, for two years, with only winter rains to water them. The orchid is fairly plentiful: I have found it in almost every suitable spot for a distance of about ten miles along the river. It occurs in companies of many, though seldom thickly clustered, individuals. It blooms in October and November, when the floods have subsided. The solitary flower is borne on a hairy scape usually about eight inches high. Though rather inconspicuous, it is strikingly peculiar in form and remarkably beautiful. Often when examining a blossom its beauty has impressed me far more than its strange shape. It is not large—roughly about three-quarters of an inch in diameter. Its color is pale greenish yellow with purple markings. The sepals and petals are about eight inches long—a broad purple stripe runs down the middle of each. With the exception of the "dorsal" sepal they are reflexed from the base. The most interesting part of the whole flower is the curiously shaped labellum which irresistibly suggests some insect to the observer. Whether the sepals and petals contribute

by representing legs I cannot quite decide. I am told this plant is known in some places as "The Ant Orchid." I fail to trace any resemblance to an ant. The grotesque shape of the labellum suggests to me some member of the mantis order. The "legs," I think, would also suit such an insect. The labellum is trilobed. The lateral lobes are small, linear, slightly hairy, erect. The broad, ovate central lobe, which represents the supposed insect's body, is rather abruptly bent near the base, and then gracefully curved so that its apex touches the base of the claw. A deep broad channel runs down its middle from near the base to the apex. It has the appearance of having been formed by compression of the sides; a corresponding keel is present on the under surface. The channel is surrounded by a much compressed horse-shoe of soft shaggy hairs. These are purple at the base of the lobe, paler and often greenish towards the apex. A fringe of similar hairs surrounds the lobe's margin, adding much to the elegant velvety appearance of the whole. At the base of the lobe three erect, deep purple appendages arise. The central and largest is attached rather lower down than the laterals. It forms the neck and head of the supposed insect, and is about one-third of the length of the body. The neck is an incurved cylindrical fleshy column. The head is trilobed, the central and largest lobe being a roundish cushion upon the inner face of the appendage, the others, small conical erect horns directed outwards above, and on either side of the central lobe. This structure bears a rather striking resemblance to the head of *Moloch horridus* (the "Mountain Devil"). The lateral appendages are short, cylindrical, more or less hairy pegs inclined outwards from the central appendage.

This complex lamina is borne upon a rather long broad claw, which is thick and fleshy at the base; and gradually thins upwards till it forms a tough springy hinge just below the lamina. Pressure against the central appendage bends the hinge and causes the whole trilobed lamina to balance upon the claw. Continued pressure causes over-balancing till the head of the appendage touches the claw. Facing this strange labellum stands the incurved gynostemium or "column." It bears on either side a broad, rather horny, translucent wing, and is surmounted by the solitary anther. The anther is two celled, each cell being closed by a stiff herbaceous valve; and containing two superposed discs of granular waxy pollen lying free in the cavity. The lower edges of these pollinia rest upon the upper edge of the circular shield-like stigma, situated immediately below the anther. The rostellum is obsolete. The whole concave surface of the stigma is glistening and sticky; and it is almost impossible to avoid bringing away the pollinia on withdrawal if the stigma be touched. The flower is odourless and without visible nectar. The foregoing facts give ample excuse for a theory of "Deceptive Resemblance." The conclusion is irresistible that some insectivorous insect mistakes the flower for its prey and pounces upon the labellum. This would be over-balanced, thus bringing the insect in contact with

the stigma. On its departure the insect would doubtless carry away the pollinia to pollinate the next flower visited. In spite of its attractiveness, I cannot consider this theory in detail, as I have not found any facts to support it.

I must now briefly sketch the history of my field observations and investigations into the subject. I first met with the orchid in October, 1904. In November I managed to devote half an hour to watching several plants. At about four o'clock on a sultry afternoon I saw a black wasp-like insect gently settle on the labellum of a flower and balance it. A slight movement of mine disturbed the fly at this stage, and it promptly departed. A little later, I witnessed a second similarly abortive attempt at pollination by a similar wasp. The following year (1905) I succeeded in seeing the operation once, rather imperfectly, however, as the wasp had its back towards me. On a sultry Saturday afternoon at the end of October, I had spent above an hour watching a number of the flowers unsuccessfully. I had given up hope of seeing anything that afternoon, so, having gathered a few orchid flowers, I was about to put them in my vasculum (which was leaning against a heap of debris in the shade), when two black wasps appeared hovering over the flowers. They seemed to be quarrelling about which should have possession. I placed the flowers in the vasculum hoping that the wasps would follow. To my great satisfaction one did follow, and carefully settling on a labellum toppled it over. In a second or two it drew back, and I saw that the pollinia from both cells were coming with it. I promptly closed the vasculum, and the wasp was my prisoner. I killed it with chloroform on reaching home. The capture was made shortly after 4 p.m. The wasp's name is at present unknown to me. I have sent specimens to America for identification. It is under an inch in length and uniformly black, except a dark red patch on either side of the thorax. It is thinly coated all over with rather long silvery hairs. The legs are long. The large wings are held erect when it settles on a flower. The antennae are rather long, smooth, kneeless, subulate, blunt. The mandibles are curved, subulate.

On the 13th of October, 1906, I succeeded in capturing two more wasps in the identical place where (and manner in which) I caught the former. These also were captured about four o'clock. I made no further observations this time but hurried home and liberated my prisoners into a rough vivarium. I hoped thus to witness the act of pollination at close quarters, but was disappointed. The wasps used all their energies in futile attempts to get out, and died within a few days. One of them bore a fragment of a pollinium, and the other had at least three full sets on its back. About a week later I again visited this favored spot with the intention of photographing the operation. I failed in this, but had the satisfaction of seeing flowers visited at least six times. I set down my vasculum containing a few blooms in the same lucky spot, and almost immediately a wasp

entered. It settled on a flower in a favorable position, and I saw enough to enable me to form a fairly clear idea of what happens. I then stuck two scapes in the ground in a sunlit space a short distance from this "lucky" spot. This I did for photographic purposes. Between them they were visited four times in less than fifteen minutes. Later on I saw three wasps hovering over one flower. Two of them bore pollinia on their backs.

The spot where these observations were made certainly deserves a little description. About the centre of what for some time during winter and spring is a small island, there stands a slender-trunked Eucalypt. Against it a half fallen (but living) ti-tree is leaning with one branch resting on the ground. This has formed a stopping place for a quantity of debris, brought thither by floods. Here my vasculum has always leaned. A few yards away to the south-west I planted my experimental scapes. The nearest growing orchids are rather further distant on the eastern side. It seems remarkable that they were not nearly so frequently visited as those I gathered and replanted but a short distance away. I should certainly have seen, if they had been.

The wasp always alights gently; I have never seen anything approaching a pounce. I think it is guided to the flower by sight, but it seems to know perfectly well what to expect. I have more than once seen a wasp alight on the edge of a labellum. In each case, either at once or after a few seconds, it has climbed into the correct position and completed the pollination act. The wasp clings to or embraces the lateral appendages. So far as I have seen, all the legs are used for the purpose. This brings the centre of gravity well towards the top of the central appendage, and causes the whole labellum to over-balance. The back of the thorax then presses rather forcibly against the stigma, which acts as a gum-brush. A circular patch, is made sticky just exactly where the pollinia on withdrawal will fall. They are thus effectually fixed on the right spot for coming against the stigma of the next flower visited. On this stigma some pollen is sure to be left. The withdrawal of the pollinia is effected by their lower edges coming in contact with the part made sticky by the upper edge of the stigma as the wasp commences to leave the flower. The curvature of the column is of importance. It ensures that the stigma shall press against the wasp's back during its visit to the flower. A stigma at the head of a straight, though equally springy, column might simply be pushed out of the way. I have not been able to ascertain the use of the column wings.

The uses of the various parts of the labellum require detailed explanation. The claw acts merely as the pedestal on which the lamina "see-saws." The central lobe of the lamina forms an excellent cushion for the wasp's abdomen. The curvature suits exactly; and the median channel ensures correct alignment of the whole insect. The velvety hairs, in addition to making the cushion soft, effectively counteract any tendency to slip.

The central appendage is of great interest, as it is the attractive organ. I am convinced that the wasp seizes the middle lobe between its mandibles and in some way sucks the juice. The horns coming, as they do, just behind the mandibles, help to give a firm hold. The whole appendage being very smooth is doubtless slippery. The horns would certainly prevent the head slipping out of the insect's grasp. The incurvature of this appendage and its place of insertion help to ensure the wasp's weight being thrown sufficiently far forward to over-balance the labellum.

The lateral appendages are just right for the wasp's legs. Their hairiness perhaps prevents their being attacked instead of the central appendage, which they resemble in most other respects.

I do not know of what use the lateral lobes of the labellum are. Perhaps they help to give the wasp a firm hold. The sepals and petals are, so far as I can see, useless except to protect the inner parts of the flower in the bud. They may, however, help to attract.

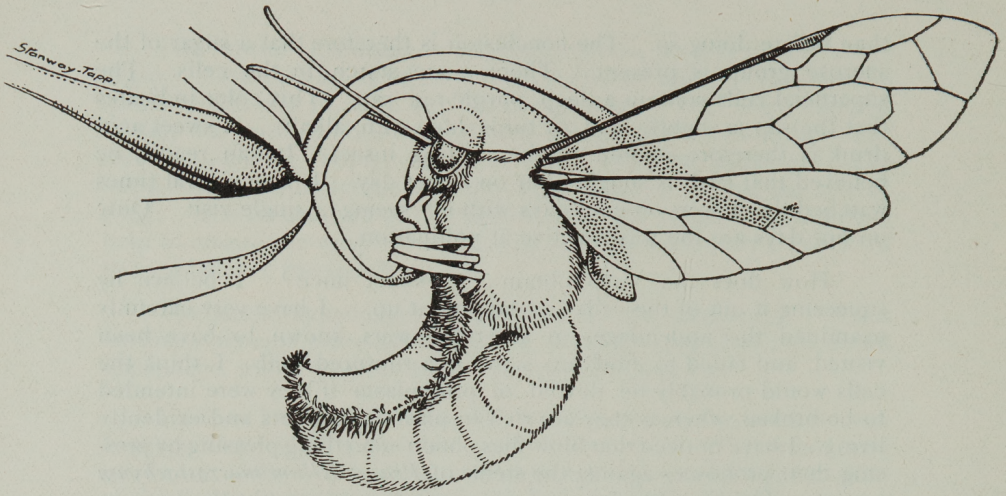
The labellum is so cunningly constructed that it is well nigh impossible for the wasp to secure juice, without seizing it in such a way as to assist in pollination.

The foregoing analysis is surely sufficient to dispel any idea that the shape of the labellum has been evolved as an attraction to insects. *The shape and position of each part is just exactly such as best suits the duty it has to perform.* Still it seems hard to believe that a resemblance so striking is useless. May it not be a case of "Protective Resemblance"; the appearance of the labellum warning off undesirable visitors or foes? I have no definite evidence on this point. Blow-flies crawl over the labellum in an aimless unconcerned manner. Cows regard the flower as a dainty morsel. They nip off the orchid blossoms and leave untouched what I should deem, for a cow, tempting grass. This negative evidence is all I can at present offer.

One question remains to be answered: What is the attractive element in the flower? A section of the central appendage (the organ of attraction) shows it to consist of a mass of variously shaped parenchyma. The outer walls of the superficial cells are rather thicker than the other cell walls, and are slightly cuticularised. All the cells are very rich in cytoplasm, and contain rather large nuclei. The cell sap contains a small amount of glucose (grape or fruit sugar), as shewn by its reduction of Fehling's solution. It also responds positively to the "Picric Acid and Alkali" test; and decolorises safranin with caustic potash. After boiling with a dilute acid the tint obtained with picric acid is about twice as dark as before. This indicates sucrose (cane sugar) or a glucoside. To decide which is present, I extracted a few appendages with absolute alcohol. Sucrose is not soluble in this menstruum; while glucosides are. On testing the extract, I found that the color was *not* deeper after boiling with acid

than before doing so. The conclusion is therefore that a sugar of the sucrose group is present. There is no starch in the cells. The superficial cells contain a deep purple-red sap. This color indicates that the sap is slightly acid (it turns blue with alkali). A sweet acid drink is therefore offered to the visiting insect. It can readily be believed that such is sought after on a hot day. I have several times watched the flowers on cool days without seeing a single visit. Only on hot days are the wasps active at pollination.

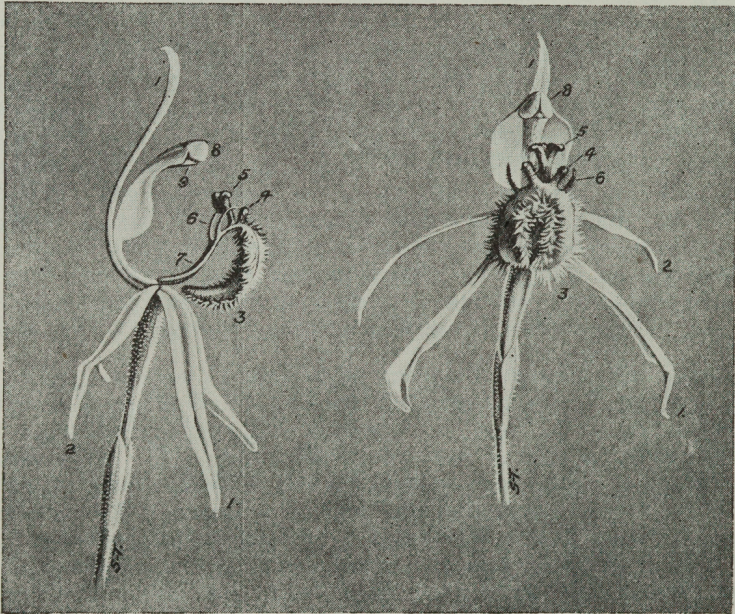
How does the wasp obtain the sweet juice? I believe by squeezing it out of the cells and lapping it up. I have very carefully examined the appendages of several flowers known to have been visited, and failed to find any sign of a ruptured cell. I think the cells would probably be devoid of protoplasm if they were intended to be broken, whereas they are rich in plasmic contents and evidently living. I have noticed that blow-flies obtain something pleasing by pressing their probosces against the stems of *Prasophyllum macrostachyum* scapes. The horn-like lobes of the appendage may assist the wasp in applying pressure. I have made no experiment in this point, as the idea of squeezing out the juice did not occur to me till recently (May, 1907), when fresh material was no longer available. This method would, I think, be of great advantage to the plant. The second visiting wasp might not carry pollen; and so perhaps with the third and fourth. As only the first wasp removes pollinia (taking all), the flower might be robbed of its juice without benefit, if the appendage were punctured each time. As it is, I think the loss is made good each time by the activity of the cells.



WASP IN FLOWER.

" P. Stanway-Tapp del.

O. H. Sargent direxit."



SIDE AND FRONT VIEWS OF FLOWER.

" P. Stanway-Tapp del.

O. H. Sargent direxit."

1. Sepals.

2. Petals.

3. Central Lobe of Labellum.

4. Lateral Appendage.

5. Central Appendage.

6. Lateral Lobe of Labellum.

7. Claw.

8. Anther.

9. Stigma.

NATIONAL PARKS

AND THE

Fauna and Flora Reserves in Australasia.

Report of a Lecture by MR. BERNARD H. WOODWARD, F.G.S.,
C.M.Z.S., Director of the W.A. Museum, delivered to
this Society on 28th May, 1907.

To the Australasian Association for the Advancement of Science the credit is due for calling public attention in a prominent and practical manner, to the importance of protecting the indigenous fauna and flora.

This Association, formed on the lines of the British Association, was founded in 1888, and held its first meeting in Sydney. Prof. Liversidge, of the University of that city, was then appointed permanent Honorary Secretary, a position, which happily for the scientific interests of Australia, he still holds.

At this meeting a strong Committee, selected from those naturalists who had long been working individually to attain this object, was appointed to consider and investigate the question of the protection of native birds and mammals:—Mr. A. J. Campbell, Dr. Haswell, Mr. R. M. Johnson, Prof. Baldwin Spencer, Prof. Stephens, Prof. R. Tate and Mr. H. Tyron, with Mr. R. Etheridge as Secretary; and at the following meeting held in Melbourne in 1890, the names of Prof. Ramsay, Colonel Legge, Prof. Thomas, Mr. S. Dixon and the Rev. J. J. Halley were added to the Committee, and at subsequent meetings other names were included.

Before this, the Native Fauna and Flora Protection Committee of the Royal Society of S.A., of which A. F. Robin was Hon. Secretary, had done much good work. The agitation for the National Park of S.A. commenced in 1883, although the Act vesting it in Trustees was not passed until 1891.

I brought the question of a reserve for this State before the W.A. Natural History Society, but could not arouse much interest. The population was then only 50 or 60,000, scattered over an area of nearly a million square miles, so it was not deemed necessary to take

any steps while such a vast extent of land was unoccupied save by the native animals and plants.

The Patron of the Society, His Excellency Sir William C. F. Robinson, G.C.M.G., the Governor, and Baron F. Von Mueller, K.C.M.G., an Hon. Member, however, took the greatest interest in the question, and urged both personally and by correspondence the importance of the work. The Baron wrote both to His Excellency and to the President, Sir John Forrest.

Prof. Liversidge wrote to Sir John Forrest, and on the 26th July, 1893, Sir John wrote to me :—"Do you know anyone who would assist the Professor." I replied that I would be pleased to do so.

Mr. A. F. Robin wrote to the Premier, and on 11th August, 1893, Sir John replied :—"That the only person I can recommend as likely to take an interest in the preservation of the Native Fauna is Mr. B. H. Woodward, and I am sure if you will write to him you will find him anxious and willing to render all assistance."

The Committee of the A.A.A.S. recommended that Rottnest Island and the Houtman Abrolhos should be made reserves. This being impossible, the Premier asked me to suggest an area. I examined the Crown Lands between the Canning, Beverley, Bannister, Pinjarrah and the Williams, and marked on a map three areas high in the Ranges and quite unsuitable for agricultural purposes. Land so rugged and so covered with York Road, narrow leaf and box poisons that the Poison Land Syndicate would not take them up at five pence per acre payable over twenty years, at the time they secured the 1,200,000 acres surrounding these three areas. I marked the one between the Bannister and Pinjarrah No. 1 as the best of the three for the purpose, as great grey kangaroos and emus abounded. The country is very picturesque, consisting of gneissic hills covered on one slope with ironstone conglomerate. From the summit of Wourhaming Hill, an immense outcrop of diorite, 1,900 feet high, the view is magnificent, all the higher peaks in the Williams District in the south, Mount Darkan in the north, and Mount Brown near York being conspicuous. There are many sandy blackboy flats, and some permanent waterholes. To show how rugged the country is, I was told by one of the mounted-police that he had crossed it once but would never do so again, as it was easier to go forty miles round by Armadale than across this block.

The timber is chiefly scrub jarrah, with wandoo in the flats, a few sheoaks on the hills, very few banksias, with on one portion a little fine jarrah and red gum on western side.

Areas Nos. 2 and 3 are neither so accessible nor as large; they lie near the Darkan and towards the Sand Springs respectively. On these there are some clay swamps, a larger proportion of sheoaks, but scarcely any fine timber.

The W.A. Natural History then drew up a petition to the Hon. the Commissioner of Crown Lands begging for the area, marked No. 1, to be reserved for the protection of the indigenous fauna and flora, and this was signed by the President (Sir John Forrest), the Vice-Presidents (the Hon. J. G. Amherst and Dr. A. Jameson), the Council, Messrs. J. S. Brooking, H. R. England, H. F. Harvey, H. D. Holmes, Geo. T. Poole, the Hon. Secretary, Bernard H. Woodward, and many other members, including Mr. Hackett and Dr. Tratman.

The President, Sir John Forrest, took this petition to His Excellency Sir W. C. F. Robinson, the patron of the Society, who transmitted it to the Hon. the Commissioner of Crown Lands, who presented it to the Cabinet on 3rd February, 1894, with a recommendation for its approval.

On 12/2/94, the Premier endorsed "Cabinet concurs" J.F., p.

On 14/2/94, His Excellency signed approval.

On 14/2/94, Reserve of 160,000 acres gazetted.

Various attempts were made to do away with the reserve in the following years, as it contains some good timber on its western border.

Mr. Geo. Throssell, in a minute dated 11/11/97, said that "he feared an ancient tree would become a thing of the past and that the reserve should contain some of the noblest trees."

In 1898 Mr. J. N. Cox, Forest Ranger, was sent to examine the timber, and reported that there was some good but a great deal of poor timber on the land.

In May, 1898, Mr. Throssell proposed to cut down the reserve to 50,000 acres. The Under Secretary, Mr. R. C. Clifton, thought it would be a pity to do so.

12/5/98—The Cabinet concurred in suggestion to reduce area to 50,000 acres.

24/8/98—H. F. Johnston, Surveyor General, wrote that he did not think the reduction should be made.

22/2/1901—Decision of Cabinet reversed and area not reduced.

3/3/1901—E. H. Absolon recommended the Reserve to be cancelled and the land handed over to the Jarrahdale Timber Company.

5/9/1901—The Commissioner of Crown Lands, Mr. Sommers, wished the Reserve to be retained intact.

22/1/1902—Reserve again gazetted with a reduction of 50 acres only from the 160,000 originally gazetted.

Thus the matter stands at the present time, except that a permit to cut timber has been granted to Whittaker Bros. in connection with which certain litigation is in progress.

Before moving a Resolution I will give a short account of the

RESERVES IN THE EASTERN STATES.

SOUTH AUSTRALIA.

The National Park at Belair, eight miles east from Adelaide, contains 2,000 acres, on the slopes of the Range of Cambrian Rocks which culminates in Mt. Lofty, the greater portion is left in a natural state, but the lower part near the entrance has been planted with exotic trees and shrubs, a sports oval and tennis courts have been laid-out, and shelters for picnic parties and refreshment rooms built.

The Park is vested in twelve Commissioners, five of whom are appointed by the Governor, and seven are *ex officio*, viz. :—The Commissioner of Crown Lands, the Mayor of Adelaide, and the five chief scientific officers of the State.

The Act of Incorporation was passed in 1891, and a set of By-laws drawn up in 1892 to protect the fauna and flora, etc.

The agitation to obtain this reserve for the protection of the fauna and flora commenced in 1883.

The Chairman is Sir Edwin T. Smith, K.C.M.G., who in January last, invited the members of the A.A.A.S. to visit the Park and entertained them. Sir Edwin and the Secretary kindly gave me much information about the management of the Park. It is, however, too small and too near the extending suburbs of Adelaide to be of use in the preservation of the larger animals, and so the Government is now setting apart the western end of Ile Decrès, or Kangaroo Island. This island is geologically a continuation of the Mount Lofty Range of Cambrian Rocks. It is very rugged and covered with dense scrub over its greater portion; there are, however, some alluvial flats dotted here and there along the coast. It is about ninety miles in length, and has an area of some 3,000 square miles, so that the six hundred square miles desired as a reserve is not much. It is best known to naturalists as having been the habitat of the small black emu, *dromæus ater*, that was exterminated about fifty years ago. Dr. Stirling told me that the wallaroo, *M. robustus*, is almost extinct in S.A., although a few years ago hundreds could be seen within thirty miles of Adelaide. He could not supply me with a good skin, as he was in want of one for his own Museum.

The pig-footed bandicoot, *Charopus*, seems to be as extinct in S.A. as it has become in this State.

VICTORIA.

This small State, only one-tenth the area of W.A., has a reserve of 70,000 acres on Wilson's Promontory. It is surrounded by sea on three sides, so does not require much expenditure for fencing. This reserve was obtained through the energy of the late Mr. Le Souef, the Director of the Melbourne Zoological Gardens.

There are also in Victoria many swamps and other places proclaimed as "Breeding Reserves for Game," on which all shooting is strictly prohibited, as is the case in the State Forests, which Mr. Dudley Le Souef informs me are numerous and extensive.

My time was so limited that I was unable to visit Wilson's Promontory.

The Field Naturalist's Club of Victoria has done much good work in urging legislative protection.

 NEW SOUTH WALES.

In Sydney I was received with even greater courtesy than in the other States, and this is saying a good deal. Mr. McDonald sent me printed particulars of the public parks, which you will find jacketed with the other documents, given into the custody of the Hon. Secretary. Mr. Farnell, Chairman, Mr. Murray White and Mr. O'Sullivan, Trustees of the National Park, took me on two occasions to that magnificent reserve, and the Secretary, Mr. Malone, supplied me with a copy of the deed of trust, map and by-laws.

The National Park lies about $17\frac{1}{2}$ miles south of Sydney. It contains about 35,000 acres, while Kuringai Chase of about the same area lies 20 miles to the north, while in and about Sydney itself there are nearly 4,000 acres of public parks and recreation grounds; these include the Botanical and Zoological Gardens.

I am greatly indebted to Mr. J. H. Maiden, the Government Botanist, for much valuable information concerning the management of these parks.

In the National Park the lyre bird is increasing in numbers and losing its shyness, for one seldom passes along Lady Carrington's drive without seeing some. Mr. S. Le Souef saw seven nests last year.

A number of views of Kuringai Chase and the National Park were thrown on the screen, showing the picturesque weathering of the Hawksbury Sandstone, the waterfalls, the upper of 111 feet and the lower of 45 feet, the luxuriant growth of the palms and trees, ferns, and the deep gorges cut by the rivers, the fish hatcheries, etc.

In the maps of the National Park, a portion is marked off as the Deer Park. In this the imported deer are flourishing, while they are fenced in and not allowed to interfere with the indigenous fauna, thus they do no harm, for the two cannot inhabit the same lands. Accli-

matisation has been a great curse to Australia; I except, of course, fish, in which the work has been most successful and profitable. The trout in New Zealand, Tasmania and New South Wales have been phenomenally successful. I also except the domestic animals save those that have been allowed to stray, such as pigs, rabbits, cats and dogs; the latter, where they have interbred with the dingoes, produce descendants far more harmful than either of the parents. The domestic cat is answerable for the extermination of the native turkeys in the Geraldton District, the fox for the rapid diminution of the lyre birds in Victoria. The hares and deer let loose in Victoria are a curse to the agriculturists of Victoria. The sparrows, goldfinches, Indian minahs, etc., etc., are execrated in the East. Fortunately the W.A. Acclimatisation Committee took warning by the experience of the East, and are now confining their attention to the usefull work of fish culture. The only noxious bird introduced into the south-west has been the laughing jackass, a deadly enemy to the small insectivorous birds and lizards. The settlers are clearing them off. We know so little about the change of habits caused by the change of environment that we cannot foretell the risks we run by indiscriminate introduction. The deer are all very well in enclosed parks like that belonging to Mr. Morgans, but you have only to visit the districts where they have been turned out into the bush to learn the opinion of the settlers. To such birds as pheasants, guinea fowl and quails, there is no objection.

Everywhere I found the people deploring the mistakes made by rash acclimatisation, and the rapid extinction of the indigenous fauna, and that the laws for the protection were either inadequate or unable to be enforced. For instance, the 33 of the 64 Victoria, an Act for the protection of kangaroos, allowing them to be killed for food but not for sale or barter is, Mr. Gale tells me, absolutely useless, for a smart lawyer proved to the Court that no conviction could be obtained under it.

Only a few years ago an Eastern hunter cleared off some 80,000 kangaroos in the N.W. and N., not for the benefit of the State, but only for his own pocket.

The netting of wild birds should be forbidden. Only a week or so ago we heard of 3,000 ducks being captured and slaughtered at Wagin. A swivel or punt gun is illegal, and so should nets be.

I have no doubt that you have all read, if not I would recommend you at once do so, the address of Colonel C. S. Ryan, the President of the A.O.U., published in the January number of the *Emu*, on the Protection of Native Birds, in which he refers to the legislation in the rest of the civilised world from Great Britain to Japan, and says that Australia and New Zealand cannot afford to be behindhand. I will only quote one other remark from his paper, viz. :—"The first object to be attained is to get the Acts in the various States strictly observed. It is notorious that some of our Game

Laws are more observed in the breach than in the fulfilment, especially in the country districts. Take for instance Sunday shooting. It is an offence against the Victorian Police Statutes; if the law were strictly carried out it would be an additional close season in favour of the birds.

Mr. Milligan reports that the Cannington District is overrun on Sundays by larrikins with guns, who fire indiscriminately at all birds.

I think this Society might move in the direction of getting the W.A. Police Act amended on Victorian lines.

In the *Emu* of April, there is an account of an Association for the Protection of Native Birds just formed at Rockhampton, Qld.

Mr. Steel, President Lin. Society of New South Wales, in his annual address in March last, alluded to the necessity of special efforts to save the native Australian fauna and flora from destruction. He deplored the wanton destruction caused by the indiscriminate slaughter by people for the sake of sport, mentioning in particular such harmless and peaceful creatures as the koala or native bear, and remarking that the shooting of domesticated animals would be equally worthy of such sportsmen.

Lastly, and to emphasise the importance of the subject, I would refer you to the British Parliamentary paper, Africa, No. 5, 1900, giving particulars of the Convention signed in London for the preservation of wild animals, birds and fish in Africa. The contracting parties were the Queen, the Emperor of Germany, the Kings of Spain, Italy, Portugal, Belgium, and the President of the French Republic. The extent of the reserves is commensurate with the eminence of the contracting Sovereigns and Rulers.

Since the last meeting, 16th July, 1907, there has been published a report by Mr. Shortridge on his zoological work in W.A., and discoveries during the past two years and a half. He offers very valuable suggestions as to the best means to hinder the rapid extermination of the many unique forms of animal life still to be found in W.A. He deplores the total destruction of the two species of Potorous:—

P. gilberti (Gld.), Gilbert's rat kangaroo.

P. platyops (Gld.), the broad-faced rat kangaroo, both common in 1840 when Gilbert was collecting for Gould, and he might have added *Charopus Castanotis* (Gray) the pig-footed bandicoot, which has apparently died out both in S.A. and in this State.

On Bernier and Dorre Islands off Carnarvon are still to be found *Lagorchestes hirsutus* (Gld.) the rufous hare wallaby, and *L. fasciatus* (P. and L.) the banded wallaby, but in rapidly diminishing numbers, and he advises that those islands be declared reserves.

Still more important from the zoologist's point of view is the question of reserving Barrow Island, on which occur at least four

species peculiar to that locality, *M. isabellinus* (Gld.), the isabelline kangaroo, described and named by Gould in 1840 from a solitary specimen, and not seen again until 1899, when I arranged to send Mr. Tunney to that island. He then obtained further specimens of that and discovered a new bandicoot, *P. barrowensis* (Thos.), a new rodent, *M. ferculinus* (Thos.), and a new wren, *M. edouardi* (Milligan), none of which are to be found elsewhere in the world.

NEW ZEALAND.

I have also received a long and interesting letter from Mr. T. F. Cheeseman, of the Museum, Auckland, who reports that there are three special reserves in New Zealand for the preservation of the Fauna and Flora:—(1) Little Barrier Island; (2) Kapiti Island; (3) Resolution Island. These islands are mountainous, rising to 5,000 feet on the last named, and are in parts well timbered. In addition, there are on the mainland numerous State Forests and the National Park, a huge block of land containing several volcanoes on an elevated plateau.

In conclusion, attention was called to the fact that although Yellowstone Park the U.S.A., which are only three and a half times the size of W.A., have a reserve of 3,578 square miles, that is to say, more than fourteen times the area of the reserve asked in the Darling Ranges, yet since 1900 they have added eight additional reserves, some of large size, and many of them islands, the best known of which are the Pelican Islands, Florida. If a country with eighty millions of inhabitants can still afford to set aside such areas for public good, how much more easily can a sparsely populated country do so, while there are no vested interests requiring compensation.

A National Park should contain some of the finest scenery and most magnificent trees in the country; such, at any rate, is the opinion of the Governments of the United States of America, of New South Wales, of New Zealand, as I have shown.

The ensuing discussion led to the following resolution being unanimously carried:—“That in the opinion of the members of this Society, the time has arrived when this Reserve, No. 2,461, Murray, gazetted 16/2/1894, and again, but with slight alteration in the boundaries on 31/1/2, for the Preservation of the Indigenous Fauna and Flora, should be vested in Trustees as a National Park, and that to attain this object, a Sub-Committee of three be appointed, who shall draw up a petition and submit it to His Excellency the Governor, the Patron of this Society, requesting His Excellency to transmit it to the Honourable the Minister for Lands, the Sub-Committee to be the President, the Right Rev. Dr. Riley, and Messrs. Cecil Andrews and Bernard H. Woodward. The Sub-Committee to be empowered to include in the Reserves requested any of the islands mentioned by Mr. Guy C. Shortridge, or any others deemed of importance for the purpose.”

MARSUPIAL MOLE.

(*NOTORYCTES TYPHLOPS*—STIRLING).

Paper read before the Society by MR. CHAS. P. CONIGRAVE.

The recent presentation to the Western Australian Museum by Mr. H. S. Trotman of a specimen of the Marsupial Mole has suggested the compilation of a few notes from the original description, which I trust will be of interest to members of the Society.

In February, 1891, Dr. E. C. Stirling, the Director of the Adelaide Museum, described the creature to members of the Royal Society of South Australia. A specimen had been seen by the doctor in 1888, but this was in such a bad state of preservation through having travelled over a thousand miles wrapped merely in a rag saturated with kerosene, that a complete description had necessarily to be postponed until additional specimens were secured. The original specimen appeared to be a female, and some preliminary notes thereon were communicated to the Royal Society of South Australia by Dr. Stirling.

During the year 1890 the then Governor of South Australia, His Excellency Lord Kintore, made a journey from Adelaide across the continent to Port Darwin, and Dr. Stirling was enabled to make the trip with His Excellency. The journey, from various reasons, was a somewhat hurried one, and the doctor was in consequence unable to visit the exact spot where *Notoryctes* had originally been discovered, but he passed within fifty miles of the locality, and through country of a precisely similar character. Dr. Stirling was fortunate in securing six complete examples and one skeleton. Amongst these were four females, which sex only had been represented by the first terribly decomposed specimen that had reached Adelaide. With additional specimens, Dr. Stirling proved the existence of a well-marked pouch in the female, a point that had not been definitely settled owing to the bad condition of the first specimen received.

A paper such as this one can necessarily be only a compilation, and so I may be pardoned for quoting largely from Dr. Stirling's original description. He said:—"It appears that the first specimen was captured by Mr. Coulthard, manager of the Frew River Station in the far north of South Australia. Attracted by some peculiar tracks

on reaching his camp one evening on the Finke River, while traversing the Idracowra Station with cattle, he followed them up and found the animal lying under a tussock of spinifex grass (*Triodia irritans*). Though Mr. Coulthard is an old bush hand, with all the watchful alertness and powers of observation usually acquired by those who live lives of difficulty and danger, this was the first and only specimen he ever saw. The creature does not appear to be very numerous. Very few of the white men in the district had ever seen it, even though constantly travelling, and not many of the natives I came across recognised the well executed drawing I carried with me. With few exceptions the animals have been captured by the aboriginals, who, with their phenomenal powers of tracking, follow up their traces until they are caught. For this reason they can only be found with certainty after rain, which sets the surface of the sand and enables it to retain tracks that would immediately be obliterated when it is dry and loose. Perpetual burrowing seems to be the characteristic feature of the life of this Mole. On emerging from the sand, it travels on the surface for a few feet, at a slowish pace, with a peculiar sinuous motion, the belly much flattened against the ground while it rests on the outsides of its fore-paws, which are thus doubled under it. It leaves behind it a sinuous triple track, the outer impressions, more or less interrupted, being caused by the feet, and the central continuous line by the tail, which seems to be pressed down in the rear. In penetrating the soil, free use, as a borer, is made of the conical snout with its horny protecting shield, and the powerful scoop-like fore-claws are also early brought into play. As it disappears from sight, the hind limbs, as well, are used to throw the sand backwards, which falls in again behind it as it goes, so that no permanent tunnel is left to mark its course. Again, emerging at some distance, it travels for a few feet upon the surface and then descends as before. I could hear nothing of its making, or occupying at any time, permanent burrows.

In bodily conformation the pouched mole is a mole-like creature, measuring about five inches in total length, and covered with long, soft and silky hair of a light fawn color, deepening in parts to golden. There are no external ears, and the eyes are represented merely by black dots buried in the skin. The nose and upper lip are protected by a peculiar quadrangular shield, the use of which to a burrowing animal is sufficiently obvious. The short limbs, which are covered with hair down to the claws, are very remarkable in structure. Both pairs are of nearly equal length, powerfully made, and furnished with five toes. In the fore-paws the third and fourth toes are enormously enlarged and furnished with huge triangular claws of great power. The short, cylindrical and stumpy tail is hard and leathery, and marked by a series of distinct rings. The pouch opens backwards, and contains two small teats. The teeth are small and weak, and appear to be forty in number. Of these, three pairs in each jaw are incisors, and seven are cheek teeth, the molars having triangular three-cusped crowns, and much resembling those of the Golden Mole.

The Western Australian Museum possessed one good specimen of *Notoryctes*, presented by Professor Baldwin Spencer, of Melbourne, but the acquisition of a purely western specimen is, of course, of the greatest interest. Mr. Trotman, the donor, and the officer second in command of the Government Survey Party, that has just returned after mapping out a stock route from Wiluna to Kimberley, secured the specimen whilst traversing the spinifex country about 150 miles to the south of Kimberley, the exact locality being the spot where the track of the Carnegie expedition of 1897 cuts that made by Colonel Warburton in 1873. Mr. Trotman, when walking over the sand plain, had his attention attracted by a small animal moving in the shadow of a spinifex bush, and this proved to be this little Mole. Mr. Trotman captured the creature, and placed it securely, as he thought, in his pocket, covering it with a silk handkerchief. On rejoining the party, Trotman was disappointed to find that the little animal had disappeared without his noticing it. Steps were at once retraced, and with the aid of a native boy, a very small ring-shaped mark was discovered on the sand. The native pointed to this, and after exhaustive digging operations the animal was recaptured, and for two days subsequently was kept alive, but the difficulties of carrying it successfully to settled districts were very apparent, so very reluctantly Mr. Trotman ended the creature's days in a flask of whisky.

The natives know little of the habits of the animal, and, in fact, stand in superstitious dread of it, their word for it meaning "devil, devil." Mr. Trotman made exhaustive enquiries from the aboriginals as to the habits of this marsupial, but they could tell nothing about its mode of life. As will be noticed, the W.A. specimen is considerably smaller than the full grown specimen from Central Australia, and is probably the youngest specimen that has yet been secured. As far as I can find, all Dr. Stirling's specimens were on an average five inches in length, whereas the W.A. skin is only 3.6 inches long.

The food of these creatures appears to be composed principally of the large white grubs called "withchetty" by the Central Australian natives, but small ants are also eaten.

It is to be hoped that future travellers over the district, from where we have received this specimen, will be rewarded by securing specimens, and what is perhaps more important still, learning more of the life habits of this strangest of our Australian marsupials.

It gives me very much pleasure to place on record before this Society the securing of the first specimen of *Notoryctes typhlops* in Western Australia, and to thank Mr. Trotman for the trouble he took in carrying the little creature since last October, when it was secured, till a few days ago, when he presented it to the Museum.

A NEW PTEROSTYLIS.

BY OSWALD H. SARGENT.

***Pterostylis constricta*, sp. nov.**

A herbaceous terrestrial orchid with small globular tuber. Juvenile leaves ovate in radical rosettes. Flowering stems slender, flexuose, minutely scabrous pappilate, without radical leaves, usually about three inches high, one-flowered. Leaves narrow, lanceolate, acute or acuminate, erect or slightly spreading, increasing in length as the stem is ascended, the longest usually about three-quarters of an inch in length.

FLOWER about three-quarters of an inch high, bright green or bronze green in color. Dorsal sepal galeate, gibbous at the base where it is rather abruptly bent, afterwards arching over the column in a graceful curve, apex acuminate. Petals falcate, acute or acuminate, hooked to the dorsal sepal and completing the galea or upper lip. Lateral sepals conjoined and cuneate at the base, erect in front of the galea, the free upper halves separated by an acute sinus, and tapering into terete, scarcely tapering, erect caudæ embracing the galea. Labellum on a short claw; lanceolate, blunt, the edges abruptly turned down at a spot about two-thirds of the distance between base and apex, and just above this constriction the labellum bends abruptly forwards. The basal appendage is ligulate and ends in a dense tuft of barbellate setæ. Column about half the length of the galea, abruptly bent near the base. Wings hatchet shaped with large, rounded lower lobes, and rather abruptly acuminate at the upper front angle.

I should place this species between *P. reflexa* and *P. præcox*. It is less leafy than the former, but more so than the latter. It differs from both in the very acute sinus between the lateral sepals, and in the remarkable labellum, the appendage of which is much more densely hairy than in either of the other species. The pinching in of

the labellum near its apex is, I believe, quite peculiar to this species. The flower is scarcely larger than that of *P. præcox*; but much smaller than that of *P. reflexa*.

When *P. constricta* and *P. reflexa* occur close together, as fairly often happens, intermediate forms are found near by. For several reasons I feel satisfied that these intermediates are hybrids.

The new species is fairly common about York. Like *P. reflexa*, it usually occurs in colonies in sandy soil rich in humus.

It flowers about August, commencing just before the close of *P. reflexa's* flowering season.

I first found it in September, 1905, near Cut Hill, not far from where I first found *P. Sargenti*.

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List of Publications on Sale.

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No. 1	September, 1899	... Out of print.
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No. 1	May, 1904	... 1/6
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