PROCEEDINGS

OF THE

ROYAL SOCIETY

OF

QUEENSLAND

FOR 1943

VOL. LV.

ISSUED 14th AUGUST, 1944.

PRICE: FIFTEEN SHILLINGS.

Printed for the Society
by
A. H. TUCKER, Government Printer, Brisbane.

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Vol. LV., No. 1.

Proceedings of the Royal Society of Queensland.

Presidential Address:

TERRA AUSTRALIS REDIVIVA.

By Douglas H. K. Lee, M.D., M.Sc., F.R.A.C.P., D.T.M.,
Professor of Physiology, University of Queensland.

(*Delivered before the Royal Society of Queensland, 29th March,* 1943; *issued separately, 16th August,* 1943.)

1. INTRODUCTION.

The subject to be taken for the Presidential Address appears to give the Retiring President as much trouble as all other cares of twelve months' office. This is evident from the opening remarks of many such past addresses and I have heard it freely expressed by recent holders of that office. As I have had during half of my term, through unavoidable circumstances, to leave the cares of office to the kindness of the Vice-Presidents, the proportionate burden in my case is even greater.

Like many before me, I have run through the list of past addresses to take counsel with those of more mature experience. While this list is a varied one, the emphasis throughout is, as is only right, upon Queensland; but in dealing with Queensland, the burden of these addresses has almost always been scientific facts or scientific history. Only rarely have the possibilities of the future been discussed. It is true that science must concern itself with facts; that prophesy is a dangerous pastime is equally true. Nevertheless, scientific progress is not made in the main by a blind unplanned pushing forward into the fog. Whether it be a scientific experiment or the development of scientific industry, one plans ahead, trying to foresee the probable developments, endeavouring to avoid dangerous pitfalls. One must preserve, however, a flexibility of plan to cope with the unforeseen or unexpected.

Now the progress and development of a country is a far greater, a far more important and a far more difficult task than the development of the greatest industry. Nevertheless, the difference is one of magnitude rather than character. Both require considerable art and practical ability, but both require exact knowledge and sound planning based upon such knowledge. In the affairs of country as in the affairs of business and experiment, there come periods of crisis, moments when great decisions have to be made, when opportunities have to be seized or forever lost. Never before has there been such a crisis in the affairs of Australia and particularly of Queensland; never before have opportunities been so forcibly thrust into our hands; never before have we been given such responsibilities as now come to us through the fortunes of war.

It is my purpose in this address to put before you this crisis, these opportunities and these responsibilities as I see them. Because this is a scientific society whose members are at least fully mindful of the importance of science if not active practitioners, I shall confine myself mainly to the place of science in these matters. But please do not imagine for a moment that I regard science as the alpha and omega of all progress. As I indicated before, there is the art and practice of development, and there are the cultural and spiritual aspects of social progress, all of equal importance. I am not, however, the person nor is this the place to enter upon their discussion. Others will be able to present to you those aspects more appropriately.

2. THE POSITION TO-DAY.

I shall not worry you by a lugubrious recital of opportunities missed, of short-sighted management or of economic fallacies in the past. It is necessary that these mistakes be studied and their lessons taken to heart, but you can do that quite easily for yourselves. If you are wise, you will leave the study of these errors not so much with complaint on your lips as a firm resolve in your hearts not to make these mistakes again, a resolve to seize the present opportunities to the full. This is the time for intelligent, inspired action, not for useless repining.

I want you first to look at the position to-day and to crystallise for yourselves its outstanding features. The first of these is, I think, a growing realisation that the northern parts of Australia have been sadly neglected, that attention has been unduly focussed upon the south-eastern part of the continent. For a long time northern residents have been pointing this out, but their complaints have, naturally enough, been regarded as those of the minority jealous of the amenities enjoyed by the majority. Only too often the reply has been, "Well, why live there?" For various reasons it was only to be expected that political and economic power should develop and concentrate in south-eastern Australia, and it is natural for the residents of such a centre to develop a somewhat restricted vision. The exigencies of war have, however, jolted these people out of their complacency, have brought to them a sudden realisation of the existence, potentialities—and dangers—of the relatively undeveloped northern lands. An important proportion has been snatched from its protected domestic environment and made to live in and on the northern land much as the pioneers did. Many of those who, by reason of holding key positions, have not been forced to go as far as this, have had to take a very lively and personal interest in the north and have seen for themselves exactly what these lands are like—their potentialities as well as their drawbacks. Realisation has dawned: the clouds of complacency must not be allowed again to darken the light.

The next outstanding feature of the position to-day is the extensive development of communications and the marked increase in numbers everywhere to be seen in North Queensland and frequently in other parts of Northern Australia. It is true that military and civil camps are liable to movement, but for the most part that movement is but from one place in the North to another in the North. Numbers are continually increasing. Roads and aerodromes spring up almost overnight. These and pre-existing installations are constantly being improved to handle more and heavier traffic. The whole population is coming to accept massive transport and rapid communications as the normal state of affairs. They will not need to be educated to development; they will be resentful if these developments are curtailed. Mushroom-like have been these developments; we must see to it that unlike mushrooms they do not wilt and crumble with the passing of the conditions that gave them birth.

Never before has there been such a clear demonstration of what man can do in the tropics—or such a definite lesson upon the dangers to be encountered. It is being amply demonstrated daily that men can successfully carry out the hardest physical labour under the hottest natural conditions with no abnormal physical consequences—*provided* that they are well-fed, well-trained and contented. In this last regard, the crucial value of all those measures which go to preserve morale is also being amply demonstrated. At all times man works best when he is free from extraneous worries, can enjoy adequate physical and mental relaxation and is pursuing a definite purpose in life. Nowhere are these things more important than in the tropics, for in loss of mental efficiency and morale we have one of the threats to successful tropical settlement. Mental efficiency can be achieved, but the will to undertake such work is reduced, and the distracting irritations increased. Specific tropical disease, especially malaria, typhus and dysentery constitute the chief danger and impediment, but these are defined entities fairly well understood and not as yet well established in Australia itself.

A fourth characteristic of the present position is the presence of large numbers of United States troops, men who hold themselves even freer to think, criticise, experiment and discuss problems than we do ourselves. They come from a country which has in its recent and perhaps in its contemporary history had to face up to many of the problems which are now confronting us. Their country has an even greater diversity of climates and natural resources than has Australia. They are not, individually or collectively, afraid of trying out new methods, of making a mistake, at least once. From them we can imbibe much spirit that is good, from them learn many techniques that are invaluable. Some of them, no doubt, will remain with us to give the impetus to development which always comes from the introduction of foreign nationals. From those who leave we must retain in some way the spirit of divine dissatisfaction.

A last, but by no means an insignificant aspect of the present day position is the development of new industries less dependent upon climate and minerals than the classical heavy industries of earlier origin. These industries are often suited to dispersion and some of them, such as the plastics industry, use as raw materials by-products of the sugar industry—fibre, alcohol, acetone.

3. THE DEMANDS OF THE FUTURE UPON TO-DAY.

What, then, are the demands which the future of tropical Australia makes upon us to-day? In brief they are two—(i.) that we make full use of all the opportunities now existing; (ii.) that we set about discovering and proving the latent possibilities. These are so true as to be almost platitudes. Why have we not done just this before; why should we have to remind ourselves of them?

The simplest answer to the problem is that hitherto we have lacked sufficient national* coherence and determination. Individuals have made progress for various personal reasons—private profit, personal aggrandisement or the satisfaction of an inner restlessness of spirit. Governmental or semi-governmental institutions have tackled many specific problems. But a consolidated, co-ordinated, continuous national effort has not yet been fully developed. The problem is too vast, the issues at stake too great to trust any longer to spontaneous individual effort or to any one specific interest. Pioneers we must have, and human nature being what it is, we always will have, but they must be linked to a national effort and they must be conscious of a national effort opening up the trails they have blazed. For the first time in history we are being welded into a nation with a purpose, and we are gaining efficiency very quickly in consequence in the pursuit of that purpose. A similar unified drive—nothing less—is required to achieve social development.

The development of a driving force is a great achievement, but that is only the start. That force must be applied correctly and efficiently. That presupposes accurate knowledge; knowledge of what resources are available, what resources are latent, what are likely to be the consequences of development. That knowledge must be kept constantly up to date and closely related to the problems as they arise. In a word, science must be an integral part of the national organization for progress. This may seem to be a truism unnecessary of expression. You can, no doubt, point to many instances of science and scientists being used in such a manner. That is true and all to the good; but these are but instances, not the regular thing. To those who have seen what goes on in other countries, the amount of time and money devoted to developmental research in this country seems exceptionally small. For a very long time we have complacently watched our best men drifting to England and America where encouragement and opportunities are so much greater. When expert opinion is required we have been content to import it temporarily, only to find that the worth of the opinion is often largely offset by lack of knowledge of local conditions. All this is natural enough in a young growing country; but we must learn to stand on our own feet. The time for that attitude arrived some years past, but we have realized it only recently and with something of a shock.

Continuous real progress can only be achieved when all engaged therein have a consciousness of reasonable security; a conviction that their efforts will not be suddenly rendered naught by national upheaval; a conviction that their families will share the material fruits of their labours and adherence to national life. Again, progress must be very slow and the inertia great if the mass of the people are not conscious of the benefits accruing to them from such progress. The history of the last one hundred and fifty years is full of instances of the retardation of progress by people who could see only disaster to their personal lives resulting therefrom. It is most essential, therefore, that the general population be educated to the benefits and need for national progress. It is essential that our knowledge be applied deliberately and publicly to the common weal and not to the restricted interests of

* The word "national" is used throughout in the sense of "a body of people united under the same government": it is the coherence of the people which is of primary importance. Without the solid backing of a united people individual effort is largely wasted; and this we can under no circumstances afford to waste.

some individual or group. How this is to be done, is a matter of national administration; we, as scientists, can help by refusing to devote our time to restricted interests and by making public our discoveries, inventions and opinions. This we can do only if we are everywhere assured of national support and freedom of expression.

A last demand by the future upon us of to-day is that we set about increasing our population. This increase is necessary more particularly in the more easily worked areas, in order to bear the burden of long-term development in less easily worked areas. This again is a matter for national administration, although undoubtedly problems will arise which will require scientific attention.

4. SCIENTIFIC KNOWLEDGE.

So we come to the more purely scientific aspects of the problem. If I have one impression more marked than another as a result of undertaking scientific work in relation to the war effort, it is of the distressingly poor state of our records of facts concerning local conditions. I should like to quote three instances. For certain purposes I desired to know the temperature of the soil at different depths up to twelve feet at different seasons of the year. I finally managed to get figures for Rothamstead (England); Tucson (Arizona) and Ceylon. I could not find a single published result for Australia. I am sure that such observations must have been made many times for special purposes, but the results are lying in some forgotten file in forgotten archives. I also wanted to know the incidence of solar radiation at different latitudes at different seasons in Australia. Again, no recorded information could be obtained, although one scientist obligingly calculated the theoretical incidence for clear days. Again, monthly and in some cases weekly averages for wet and dry bulb temperatures were required for many stations. This information was available but had to be specially culled from the Departmental records; it did not exist in an easily reproducible form; it had never been published. I could multiply the instances of failure to record or to publish easily ascertained data upon natural phenomena, but these will serve to indicate the large amount of work there is to be done in making observations upon simple phenomena and applying them to local problems. The existing lack is not the fault of any individual; it is just symptomatic of our national unawareness.

Let me now summarise what I consider the most important items in the future scientific programme as applied to tropical development. The first undoubtedly is the proper compilation of all possible data concerning the natural phenomena of this region—its physiography, climates, soils, geology, flora and fauna. Much of this has been done and done excellently; much has been done but reposes in forgotten files or fickle memories; undoubtedly much remains to be done. It is certain that it all requires co-ordination and collection in readily accessible form. I suggest to the incoming Council that they make it a duty to collect and care for any such records made available by members until such time as a better home can be found for them.

The next most important item is to know the effects these conditions are likely to have upon man, his health, happiness and productivity; or conversely, the conditions man requires to achieve his optimum state. Something has been done towards securing and correlating this knowledge in recent years, particularly for war purposes, but much remains to be done.

Following upon man himself, comes the question of the effect these conditions have upon the various animals necessary to his economic welfare. In a crude way we know that certain animals do or do not "do well" in certain areas. We know much about the parasitic diseases prevailing in different areas. Generally speaking, however, animal physiology has not gone beyond the superficial stage and animal pathology needs very much greater study and correlation with human pathology. The biochemical aspects of animal behaviour and disease are in a particularly primitive condition.

From animals we may turn to plants, wild and cultivated. Here too, while much has been done, war-time needs have awakened us to the tremendous gaps in our knowledge. The effect of soils, seasons and climates upon other than our main crops of sugar and wheat is but little understood. The variation of vitamin content or of toxic property with variation in growth conditions is very imperfectly understood.

Next in logical sequence comes the utilisation of natural phenomena or primary products for the benefit of mankind, the moulding of environment to human ends. Here, more than anywhere, the impetus given by war can more easily and rapidly be transferred to the larger national end of social development. There is no limit to the possibilities in this direction; I am just afraid that the primary developments will not be sufficiently advanced to give these secondary developments full scope.

Running concurrently with all these developments there must be a very great degree of co-ordination and systematisation of our knowledge. It must be made easy for the enquirer to ascertain just what is known about the problems confronting him, what facts have been ascertained, what lines of investigation have been tried, what opinions are held. It is neither just nor economical that every person with a problem should have to spend a large part of his time sifting large masses of literature and records scattered through a number of institutions for a few grains of information. Such information or handy references to it should be collected together in some convenient place and a reliable information service provided. Every large industrial concern maintains such a service in relation to its own problems; the organization of national development can do with nothing less.

5. A PLAN FOR SCIENCE IN TROPICAL DEVELOPMENT.

The operators in the scientific side of tropical development fall into three classes:—

A. The Producers of Knowledge.

- Individual scientists, professional and amateur.
- Scientific institutes.
- Industrial research.
- Government department research.
- Scientific literature.
- Museums.

B. The Users of Knowledge.

- Government executives.
- Organized industry; primary, secondary and tertiary.
- Individual producers.
- Applied scientists and scientific professions.

C. The Purveyors of Knowledge.

Universities.

Technical colleges.

Secondary schools.

Press and radio.

Libraries and museums.

These are all operative to-day to greater or lesser degree, but in no case to the degree needed for proper national development. The relationships between the operators are loose, nebulous and individual. Can they be integrated and if so, how?

There are probably many ways of achieving this, and the one I put before you now is but an example; nevertheless, it is the one, I think, which has the greatest chance of success. I suggest that the greatest need is a focal point; a focal point based in scientific fact, not in expediency. That focal point would be provided by a central Institute —let us say, an Institute of Tropical Development—*provided* that its plan was large enough, its facilities good enough and its personnel great enough to do the job properly. No half-hearted or cheese-paring compromise would do. Such an action could only add to the already existing confusion. To illustrate my conception, let me set out what would be its objects, its facilities and its relationship to other institutions.

Objects—

1. To collect and systematise all available information relating to scientific aspects of tropical development.

2. To supply information on scientific aspects of tropical development and to arrange contact with individual specialists or groups of specialists.

3. To provide centralized housing for scientific libraries and records.

4. To provide laboratory space and routine laboratory facilities for accredited research workers.

5. To assist field work in tropical problems.

6. To assist educational projects.

Facilities—

1. Full scientific library facilities.

2. Secretarial and statistical assistance for research workers.

3. Meeting and lecture rooms.

4. Space and apparatus for exhibits, demonstrations, films, &c.

5. Routine laboratory equipment and services for research workers.

6. Directorate and research staff.

Relationships—

1. *Government.* Erection and maintenance largely governmental. Full assistance to Government in scientific matters other than routine or executive. Co-ordinated regular discussions and advisory groups.

2. *Universities.* Full assistance to approved research projects. Co-ordination of library facilities. May be administered through University.

3. *Scientific Societies.* Provision of house-room and co-ordination of library facilities.

4. *Technical and other colleges and schools.* Free use of library and technical facilities.

5. *Industry.* Provision of information and arrangement of discussion or advisory groups.

6. *Individual scientists.* Free use of facilities. Co-option for advisory purposes.

7. *Press and radio.* Provision of accurate information. Arrangement of contact with individual or group of specialists.

8. *Other research bodies.* Co-operation without unnecessary overlap. Assist dissemination of information.

Such a plan will take care of the integration of scientific knowledge. There remain two other very important matters. The first is the use of this knowledge. It remains in some quarters a debatable matter to what extent science or scientists should intrude upon the executive sphere, the actual use—or misuse—of the knowledge they make available. As one writer puts it, to what extent should he bury his head in academic sand and murmur, "politics don't count"? The power the scientist can wield for the public good depends upon two factors—(i.) the consciousness of executives of the need for such extension work; (ii.) the ability shown by the scientist for dealing with practical problems. Both the individual scientist and organized scientific bodies will need to give much more attention to both these points in the future. It is quite important that only those scientists who show a special aptitude for the handling of practical problems should be allowed to intrude upon that sphere. The enthusiastic academician, when he gets outside of his sphere, is liable to do much more harm than good, both to the individual project and to the cause of applied science generally.

The second matter is the production of the scientific workers themselves in all three categories—producers, purveyors and users. The majority of the science graduates at present join the ranks of the users. Far too few become producers or purveyors. This is partly due to the unawareness of the general public of the advantages of University training, partly to economic difficulties and partly to the fewness of the positions offering and their unattractiveness. All these restrictions must be remedied. The first thing to do is to create the demand, and that means that those whose responsibilities include scientific development—Government, industry, education—must plan for the development and create the positions necessary, and make them sufficiently attractive to the right types. Attention must then be given to supplying the demand by educating the public to the possibilities, by adequate financial assistance where required to the deserving types (this is already begun) and by expanding training facilities.

Although they are really included in the foregoing, the research workers need special comment. The number of students really suited to research work is small, but they must be carefully selected, inspired and trained. They must then be given facilities. This is, in Australia to-day, the weakest link in the chain of scientific development. Much more money, many more facilities are required. The individual research worker must not be regarded as a production unit. Some are lucky, some have the gift of individual production, but there are others who seem to miss the final step which brings fame. These are not failures; they contribute essentially to the forward march of scientific knowledge by their own work, by critical discussion with others, and by elimination of unproductive lines. Research must be judged by its total output, not by individual successes or failures. Wise and experienced administration will eliminate those unsuited to research at an early stage, but it cannot and must not attempt to demand discoveries from each and every worker. Research is costly; to the production manager it may seem wasteful, but it cannot be coerced. The individual workers must have security and freedom of action—they must also have guidance, and that is why the very best of directors are required. A battalion is as good as its commanding officer; a research institute is seldom any better than its director. You would do well to read Alan Gregg's recent publication—"The Furtherance of Medical Research," to see these facts set out more fully and more cogently than it is possible for me to do here. Correspondence in the recent numbers of the Australian Journal of Science by Prescott, Rivett and Hallsworth clinches many of these points in respect to Australia.

Let me now summarise the plan. First, a focal point, in the nature of a scientific institute, to co-ordinate knowledge and effort. Secondly, greater provision for the use of science and scientific workers in all aspects of national development. Thirdly, increased attention to the encouragement and training of scientists.

6. THE RESPONSIBILITIES OF THE SCIENTIST.

How are these things to be brought about? It is perfectly plain that the movement has to start with the scientist and the scientific bodies themselves. They must continually draw attention to the prime importance of scientific knowledge, scientific planning and scientific methods in national development. Executives cannot be blamed for disregarding science if it utters but an occasional plaintive cry amidst the thunder of national machinery. Scientists, or their representatives, must enforce attention, talk politics with the politician, business with the industrialist, social welfare with the workers' representative. This process must be continuous, not sporadic; it must be in accordance with reality, not utopian; it must be disinterested, not partisan—especially not partisan towards science. Facts in the hands of the honest and courageous man constitute in the long run the best weapon.

While science is being thus presented to others, it behoves the scientists themselves to put their own house in order. I would like each scientist to put the following questions to himself and to give to each a scientific,—i.e., an unbiassed—answer:—

(i.) Am I working as hard as I reasonably could?

(ii.) Am I working as efficiently as I could?

(iii.) Am I attempting as far as possible to integrate my work with that of others?

(iv.) Am I tackling my job systematically, or am I playing about and deluding myself?

(v.) Is the line I am following sufficiently important, having due regard to all the circumstances, to warrant my spending my time at it?

(vi.) Do I waste time in administrative niceties and delay the main pursuit?

(vii.) Am I becoming an arm-chair scientist, or do I still roll up my sleeves and enjoy doing it? Am I a talker or a doer?

(viii.) Do I place my own personal advancement or advantage before that of the nation?

(ix.) Do I tend to place personal accomplishments and learning, which will die with me, before the advancement of science, which will continue after me?

(x.) Could I not start now on that project which I have been going to undertake for so long?

(xi.) Have I put on record various facts I have gleaned and observations I have made so that other people will not waste time repeating them unnecessarily?

When you have your answers you will know best where *you* can start in helping forward the national progress I have been urging.

CONCLUSION.

Looking back over the manuscript of this address I find that it departs from all the principles I like to see followed in the delivery of a lecture. Perhaps that is a good thing. A lecture is usually impersonal; I do not want this to be impersonal. I want it to express what I, as Retiring President of the Royal Society of Queensland, feel about things; what I feel Science should contribute to-day to the national life. I want to convey the spirit, not the detail of progress. There are always plenty of opportunities of planning out detail, but these are of no consequence if the will to action is wanting. It is action which is wanted to-day from the scientific leaders in this community; where better could it start than in this Society?

AUSTRALIAN STRATIOMYIIDAE II.

Tribe MYXOSARGINI.

By G. H. Hardy, Queensland University, Brisbane.

(*Received 12th March, 1943; accepted for publication 5th April, 1943; issued separately 7th September, 1943.*)

An improved scheme for determining subfamilies of Stratiomyiidae was given in these *Proceedings* (XLIV., 1932, pp. 41-9) and was subsequently adopted by Mr. M. T. James in various papers. Recently, however, this author has written on the tribe Myxosargini in a way that breaks down the arrangement of genera under Sarginae.

In his new tribe Myxosargini, James (Pan-Pacific Entom. xviii. 1942, pp. 49-60) brings together *Myxosargus*, which originally had been placed under Stratiomyiinae, and five other genera variously placed, and he also added the possibility of *Acanthasargus* and *Melanochroa* being synonyms of *Nothomyia*. An analysis of the genera and species with distribution is as follows:—

Nothomyia Loew 1869, including synonym *Berisargus* Linden 1933; 10 species in the Americas.

Myxosargus Brauer 1882; 8 species in the Americas.

Melanochroa Roder 1886; 1 species in Brazil.

Prosopochrysa deMeijere 1907; 1 species in India and Java.

Acanthasargus White 1914; 4 species in Australia.

Rhaphiocerina Linden 1938; 1 species in Japan.

Geranopus White 1914; 1 species in Australia.

The genus *Geranopus* added above, was unknown to, and not mentioned by, James, and also it appears that two at least of the three species placed under *Sargus* in Australia may be more remotely allied to Myxosargini, but two of the three genera in Australia come under the tribe, and may be readily distinguished as follows:—

1. Without scutellar spines .. .. *Sargus*.
   With scutellar spines (Tribe Myxosargini) 2
2. With the cubital vein touching the vein bordering the median cell; no cross-vein is to be seen there .. .. *Geranopus*.
   With the cubital vein separated from the vein bordering the median cell; a cross-vein connects them .. .. *Acanthasargus*.

Under tribe Myxosargini, genera are brought together on characters that hitherto have not been regarded as significant. The components, being complex in regard to many structures, have been relegated to various subfamilies, but probably they are marking some phylogenetical development along which genus *Sargus* may have had its origin. The more primitive forms have been relegated to Stratiomyiinae, under which subfamily James retains the tribe.

A REVISION OF THE AUSTRALIAN NOLIDAE (LEPIDOPTERA).

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(*Received* 16*th February,* 1943; *accepted for publication* 5*th April,* 1943; *issued separately,* 1*st March,* 1944.)

The *Nolidae* are a group that has been through many vicissitudes. Linnaeus (1758) described the first species as *Tinea cucullatella.* Huebner (1827) described the genus *Roeselia,* placing it in the *Tortricidae.* Stainton (1859) placed the family in the *Pyraloidea.* Even as late as 1902, Dyar in his Catalogue of the American Lepidoptera, placed the *Nolidae* in his *Tineoidea,* which included the *Pyralidae* and *Tortricidae.* There seems to have been no reason for these conjectures, except the small size or superficial resemblances of the species.

We owe our first real knowledge of the Australian species to Meyrick, who described 18 species (a few of which had been previously named) in Proc. Linn. Soc. N.S. Wales in 1886 and 1888. He placed them at that time in the *Arctiadae,* as also he did in his Handbook of British Lepidoptera (1895), but in his Revised Handbook (1927) he recognised them as a separate family. Hampson, in the second volume of his Catalogue of the Lepidoptera Phalaenae (1900), gave us for the first time a complete revision of the whole family in the world fauna, treating it as a subfamily of the *Arctiadae.* This was added to in the first volume of the Supplement to that work (1914). These are still, and will long remain, the chief authority for the group.

The family may be thus defined: Tongue present. Palpi well developed, laterally compressed, sometimes very long, porrect or obliquely ascending. Antennae with a small tuft of scales on lower edge of basal joint. Thorax usually smooth, but sometimes with a posterior crest. Abdomen often with a dorsal crest on first segment, and sometimes on second segment. Legs smooth; spurs well developed. Forewings with tufts of scales; without areole. Hindwings with 12 coincident with cell to middle.

A long anastomosis of 12 of the hindwings with the cell occurs in some groups of the *Noctuidae,* but in these this vein is separate at its base; complete fusion is a character common to the *Nolidae* and *Arctiadae.* As I have stated elsewhere, I consider this is an instance of parallel evolution. The tongue may be well developed or rather weak; sometimes, when retracted, it is completely hidden by the well developed and appressed palpi; it is doubtful whether it is ever absent. The antennal tuft is a small but constant character. The tufts on the forewings are subcostal and three in number, the third being either before, at, or after middle. Occasionally a fourth tuft, more dorsal and peripheral, is present. To this arrangement the genus *Zia* is an exception; in it the tufts are arranged differently.

I agree with Hampson that the *Nolidae* are a direct development of the *Noctuidae,* the *Sarrhothripinae* being their immediate allies; but I hold that the *Arctiadae* are a direct development of the *Hypsidae.*

Key to Genera.

1.	Forewings with 9 and 10 absent	2		
	Forewings with 9 present, 10 absent	4		
	Forewings with 9 and 10 present	6		
2.	Forewings with 3 and 4 stalked		*Pisara*	1
	Forewings with 3 and 4 separate	3		
3.	Abdomen with basal dorsal crests		*Celama*	2
	Abdomen without crests		*Sorocostia*	3
4.	Forewings with cell short and its lower angle strongly produced		*Idiocyttara*	4
	Forewings with cell not so formed	5		
5.	Abdomen with basal dorsal crest, male antennae ciliated		*Nola*	5
	Abdomen without dorsal crests, male antennae with long pectinations		*Selca*	6
6.	Forewings with 10 stalked with 7, 8, 9		*Roeselia*	7
	Forewings with 10 separate	7		
7.	Abdomen without dorsal crests	8		
	Abdomen with dorsal crests		*Zia*	10
8.	Hindwings with 6 and 7 stalked		*Aedemon*	8
	Hindwings with 6 and 7 connate		*Spathoptila*	9

The discrimination between the two largest genera, *Celama* and *Nola* requires care, for it is sometimes not easy. Apart from this the application of this key should not be difficult.

The diagnosis of the species of these two genera will always be a difficult problem, and cannot be made easier by keys. Close attention must be paid to the following structural characters:—

1. The length of the palpi in terms of the breadth of the eyes.
2. The structure of the male antennae.
3. The number and position of the tufts on the forewings. These are easily abraded, and this must be allowed for.
4. The markings on the forewings, especially the antemedian and postmedian lines, must be carefully studied, and compared with the best available descriptions. They are subject to variation, not so much in their pattern, as in the obsolescence of parts of the pattern, even in fresh specimens. Worn examples may be misleading, and cannot always be determined. For the determination of a species a series or at least one example in perfect condition is desirable.

1. Gen. Pisara Wlk.

J. Linn. Soc. Zool. 1862, p.117; Hmps. ii, p.5.

Palpi long, laterally compressed; second joint rough-scaled above and beneath; terminal joint short, pointed. Antennae of male with fascicles of cilia. Abdomen with dorsal tufts on first and second segments. Forewings with 2 from near angle, 3 and 4 stalked from angle, 5 closely approximated, 6 from well below upper angle, 7 and 8 stalked, 9 and 10 absent, 11 separate. Hindwings with 2 from three-fourths, 3 and 4 coincident from angle, 5 from middle of cell, 6 and 7 stalked, 12 anastomosing to middle of cell. Type: *P. opalina* Wlk. from Borneo and India.

Only two species have been described.

1. PISARA HYALOSPILA.

Pisara hyalospila Hmps. Suppl. i, p.369; Turn., Proc. Roy. Soc. Q. 1915, p.11.

♂ ♀, 20–22 mm. Palpi 2 and a half. Antennae of male with fascicles of cilia (3). Forewings of male with a suboblong fovea in posterior end of cell; whitish; tufts large, brassy-fuscous, second and third approximated, third tuft median; a large brassy-fuscous basal patch, its posterior edge from two-fifths costa to near middle of dorsum, nearly straight; postmedian line slender, fuscous, sometimes reduced to dots, from costa before middle, subcostal to two-thirds, there acutely toothed, thence strongly sinuate to three-fifths dorsum; subterminal fuscous, from four-fifths costa to tornus, with shallow subcostal and submedian prominences, often preceded by a band of brassy-fuscous suffusion.

NORTH QUEENSLAND: Cape York; Cairns; Atherton. QUEENSLAND: Nambour; Brisbane; McPherson Range. NEW SOUTH WALES: Lismore.

2. Gen. CELAMA.

Wlk., xxxii, p.500; Hmps. ii, p.5.

Palpi porrect, laterally compressed, moderate or long, sometimes very long, rough-scaled above and beneath; terminal joint minute. Antennae of male with fine short pectinations or with fascicles of cilia. Abdomen with dorsal crests on first and second segments. Forewings with 2 from two-thirds, 3 from angle, 4 and 5 approximated at origin, 6 from below upper angle, 7 and 8 stalked, 9 and 10 absent, 11 separate. Hindwings with 2 from shortly before angle, 3 and 4 coincident from angle, 5 widely separate, 6 and 7 stalked, 12 anastomosing with cell to middle. Type: *C. bifascialis* Wlk. Closely allied to *Nola,* differing only in the absence of vein 9 of the forewing. Occasionally in that genus 9 separates close to the wing margin, and is difficult to observe, but descaling is seldom necessary. The genus cannot be divided according to the antennal differences, for in many species the fascicles consist of branching cilia, and seem to be intermediate, the pectinations being reduced to such fineness as to be imperceptible.

2. CELAMA DIASTROPHA n.sp.

διαστροφος, distorted.

♂ ♀, 13–14 mm. Head and thorax white. Palpi 3; pale brown, sometimes with a fuscous ventral streak from base to three-fourths. Antennae pale grey, towards base white; in male with fascicles of branching cilia (3). Abdomen grey-whitish. Legs whitish; anterior pair fuscous with whitish tarsal rings. Forewings suboval, costa strongly arched near base, thence only slightly, apex rounded, termen slightly rounded, oblique; undersurface in male with raised ridges of altered scales on subcoastal and median veins in basal area, together with elongate foveal depressions between them and in cell; cell shortened to one-third and with strongly curved costal edge; 7 and 8 short-stalked or approximated from angle; in female cell normal and 7 and 8 short-stalked; white with fuscous and brown markings; tufts large, pale brown, third tuft absent, a fourth tuft on lower angle of cell; a short dark fuscous streak from base of costa along fold; antemedian line imperfect or represented by a few dots; a fuscous suffusion between fourth tuft and mid-dorsum; postmedian line represented by a series of dark fuscous dots, from one-third costa to middle of disc at two-thirds, there angled inwards to end at mid-dorsum; subterminal interrupted, suffused, or reduced to dots; a series of brownish dots on termen and costa beyond middle; cilia whitish with pale fuscous bars. Hindwings and cilia whitish.

NORTH QUEENSLAND: Cape York in October and November (W. B. Barnard); Kuranda in October (F. P. Dodd); five specimens.

3. COELAMA COELOPHORA n.sp.

κοιλοφορος, bearing a hollow.

♂, 15 mm. Head white. Palpi 2; pale grey. Antennae grey, towards base white. Thorax grey; patagia white. Abdomen grey-whitish. Legs whitish; anterior pair fuscous. Forewings rather narrow, suboval, costa gently arched, apex rounded, termen obliquely rounded; in male cell short (one-third) and occupied by a deep suboblong hollow or fovea; 3, 4, 5 stalked and connate with 2 from angle of cell, 7 and 8 long-stalked, 11 curved from before upper angle; grey with fuscous markings; tufts approximated, grey, third tuft at one-third; a slender oblique inwardly curved line from second tuft towards dorsum; postmedian line slender, from midcosta, subcostal to three-fourths, thence oblique and dentate to fourth-fifths, curved inwards on vein 5 and sinuate to three-fourths dorsum; subterminal suffused; a terminal series of dots; cilia grey. Hindwings and cilia whitish. The type is in poor condition, and this description may need supplementing, but the male is easily recognised by its structural characters.

QUEENSLAND: Brisbane in August; one specimen.

4. CELAMA CRUCIGERA n.sp.

crucigerus, marked with a cross.

♂, 18 mm. Head white. Palpi 2 and a half, grey, upper edge white. Antennae grey, towards base white; in male with fascicles of cilia (2 and a half). Thorax grey. Abdomen grey-whitish; basal crest grey. Legs fuscous with whitish rings; posterior pair except tarsi mostly whitish. Forewings elongate-triangular, costa gently arched, apex pointed, termen slightly rounded, strongly oblique; in male with a suboblong posterior fovea in cell; cell short (one-third); 3, 4, 5 stalked from angle of cell connate with 2, 11 curved from near upper angle; white lightly sprinkled with grey and fuscous; tufts grey, approximated, third tuft at one-third; a subdorsal dot at one-fifth, connected by a fine line with another beneath and before middle; an oblique line from about middle of lower elge of cell, crossing previous line, to above dorsum at four-fifths, there sharply angled to three-fourths dorsum; a spot in cell; another on costa at two-fifths; postmedian represented by short streaks on veins, that on vein 6 displaced inwards; subterminal represented by some vague suffusion; cilia grey with some white bars. Hindwings and cilia whitish. Agrees with male of *C. coelophora* in neuration, but with very different pattern on forewings.

QUEENSLAND: McPherson Range (Springbrook) in September; one specimen (W. B. Barnard). Type in Queensland Museum.

5. CELAMA COELOBATHRA n.sp.

κοιλοβαθρος, with hollowed base.

♂, 19 mm. Head white. Palpi 4, grey, upper edge and basal two-thirds of lower edge white. Antennae grey, towards base white; in male with fine pectinations bearing tufts of cilia (2). Thorax whitish; tegulae sprinkled with fuscous. Abdomen grey; tuft whitish; underside pale ochreous. Legs whitish; anterior pair grey with whitish rings. Forewings elongate-triangular, costa gently arched, apex pointed, termen nearly straight, oblique; in male with a small basal fovea in cell; neuration normal; whitish sparsely sprinkled with grey; markings fuscous; tufts small, fuscous, third tuft before middle; costal dots at base, one-fourth, and middle; antemedian line obsolete; postmedian slender, from beneath midcosta, subcostal for a short distance, then angled to become transverse, and thickened by fuscous suffusion anteriorly, about middle bent inwards and suffused to dorsum at two-thirds, with a subdorsal projection; subterminal pale; suffused with a small projection above middle, and a larger rounded beneath middle; some terminal dots; cilia grey. Hindwings and cilia whitish.

WEST AUSTRALIA: Perth, one specimen received from Mr. W. H. Mathews.

6. CELAMA THYRIDOTA.

Celama thyridota Hmps., Cat. Lep. Phal. Suppl. i, p.390; Turn., Proc. Roy. Soc. Q. 1915, p.12.

Antennae with fine pectinations ending in fascicles of cilia (3 and a half). The male type, which is still unique, is easily recognised by its foveae. With it I could associate several females, but unfortunately I am unable to give any criteria, by which these can be distinguished from *C. bifascialis,* of which I have seen a series of both sexes.

NORTH QUEENSLAND: Townsville.

7. CELAMA FOVIFERA.

Celama fovifera Hmps., Ann. Mag. Nat. Hist. (7), xi, p.342; Cat. Lep. Phal. Suppl. i, p.401.

Unknown to me.

NORTH QUEENSLAND: Townsville.

8. CELAMA BIFASCIALIS.

Pisara bifascialis Wlk. xxxi, p.244.

Celama liparisalis Wlk. xxxii, p.500.

Celama bifascialis Hmps. ii, p.11, pl.18, f.4.

Palpi 2 and a half. Antennae with fine pectinations ending in fascicles of cilia (3 and a half).

NORTH QUEENSLAND: Thursday I.; Cape York; Cardwell; Dunk I., Townsville. QUEENSLAND: Nambour; Brisbane; Toowoomba; NEW SOUTH WALES: Lismore.

9. CELAMA SEMOGRAPTA.

Sorocostia semograpta Meyr., Proc. Linn. Soc. N.S.W. 1886, p.720.

Nola semograpta Hmps. ii, p.42, pl.19, f.10.

Nestiodes eremnopa Turn., Proc. Roy. Soc. Tas. 1938, p.71.

Tongue present but weakly developed. Palpi 1 and a fourth. Antennae in male with fascicles of cilia (2 and a half).

NEW SOUTH WALES: Ebor; Sydney; Mittagong. VICTORIA: Gisborne. TASMANIA: Deloraine; Bothwell; Hobart; Mt. Wellington. SOUTH AUSTRALIA: Mt. Lofty.

10. Celama taeniata.

Nola taeniata Snel., Tijd. v, Ent. 1874, p.65, pl.6, f.1.

Roeselia fragilis Swin., Tr. Ent. Soc. 1890, p.184; Hmps., Moths Ind. ii, p.139.

Sorocostia mesozona Luc. Proc Linn. Soc. N.S.W. 1889, p.1075.

♂ ♀, 12–16 mm. Head and thorax white. Palpi 2; grey, upper surface white. Antennae grey, near base white; in male with very fine pectinations carrying tufts of cilia (1 and a half). Abdomen grey-whitish. Legs whitish; anterior pair grey with whitish rings. Forewings elongate-triangular, costa gently arched, termen slightly rounded, slightly oblique; white; tufts fuscous, first tuft small, third tuft beyond middle, included in fascia; a series of minute costal striae more or less developed; second tuft connected with dorsum, and giving off a short, very slender, sinuate line towards dorsum; a rather broad postmedian fascia, brown more or less mixed with dark fuscous and sprinkled with lustrous white scales, its posterior edge oblique from two-thirds costa but soon angled inwardly, oblique and slightly waved to two-thirds dorsum; a slender wavy fuscous or brownish subterminal line more or less developed; sometimes a submarginal series of dots; cilia grey. Hindwings and cilia white. Very distinct.

North Australia: Darwin. North Queensland: Innisfail. Queensland: Maryborough; Brisbane; Tweed Heads. New South Wales: Lismore. Also from Java, Ceylon and India.

11. Celama microphila n.sp.

Sorocostia microphila Turn., Trans. Roy. Soc. S.A. 1899, p.16.

Celama microphila Hmps., Suppl. i, p.402, pl.23, f.9.

♂ ♀, 11–13 mm. Head, thorax, and abdomen grey. Palpi 1 and a half; fuscous. Antennae grey; in male with fascicles of cilia (2). Legs fuscous with whitish rings. Forewings narrowly triangular, costa slightly arched, apex round-pointed, termen nearly straight, strongly oblique; whitish with fuscous markings and scattered scales; tufts grey-whitish, sometimes partly fuscous, third tuft median; second tuft connected with one-fourth costa, and emitting a fine line to one-fifth dorsum; sometimes costal dots at one-fourth and middle; postmedian line from near midcosta, outwardly oblique to middle of disc, thence inwardly curved to four-fifths dorsum, well defined posteriorly, but suffused anteriorly in dorsal half; subterminal line ill defined and irregularly dentate; sometimes a terminal series of dots; cilia grey with fuscous sprinkling. Hindwings and cilia grey-whitish. Small and obscure, but not to be mistaken for any other species.

Queensland: Brisbane; Toowoomba.

12. Celama atmophanes n.sp.

ἀτμοφανης, smoky.

♂ ♀, 13–15 mm. Head white or grey. Palpi 1 and a fourth; fuscous. Antennae fuscous; in male with fascicles of branching cilia (1 and a half). Thorax fuscous. Abdomen grey. Legs fuscous with whitish rings; posterior pair except tarsi mostly whitish. Forewings narrow, suboval, costa rather strongly arched, apex rounded, termen slightly rounded, strongly oblique; white more or less densely sprinkled with fuscous; markings dark fuscous; tufts small, dark fuscous, third tuft median; a large basal costal spot; a spot on one-fourth costa, connected with second tuft, from which a line proceeds to one-third dorsum, indented above margin; postmedian line commencing from a dot on costa before middle, obliquely curved to middle of disc at two-thirds, there acutely angled, and inwardly curved to two-thirds dorsum, not dentate; subterminal suffused, interrupted and ill-defined; a terminal suffusion with some darker dots; cilia grey with some fuscous scales. Hindwings and cilia grey. Obscure, but can hardly be mistaken for any other species.

QUEENSLAND: Injune in October, November, February, March, and April; ten specimens (W. B. Barnard). Type in Queensland Museum.

13. CELAMA LEUCOMA.

Sorocostia leucoma Meyr., Proc. Linn. Soc. N.S.W. 1886, p.725.

Celama leucoma Hmps. ii, p.19, pl.18, f.15.

♂ ♀, 17–18 mm. Head white. Palpi 1 and a half; whitish. Antennae grey, near base white; in male with fascicles of cilia (2). Thorax pale grey; patagia white. Abdomen pale grey. Legs whitish; anterior and middle tarsi fuscous with whitish rings. Forewings moderately broad, triangular, costa gently arched, apex rounded, termen obliquely rounded; pale grey; a white sub-basal costal patch; tufts large, grey, second and third approximated, third tuft beyond middle; markings fuscous; a dot or short mark on costa near base, giving off a short line, anterior to first tuft, to fold or beyond; no antemedian line; a costal dot at one-fourth, another median touching third tuft, and sometimes others smaller between and beyond these; a moderate fascia, including third tuft, from midcosta obliquely outwards, obtusely angled inwards at two-thirds, and inwardly curved to two-thirds dorsum; some white dots or suffusion on apical third of costa; sub-terminal line suffused, with obtuse subcostal and median projections; some terminal dots or suffusion; cilia grey sprinkled with fuscous. Very distinct.

NEW SOUTH WALES: Sydney.

14. CELAMA TETRALOPHA n.sp.

τετραλοφος, with four tufts.

♂, 18–20 mm; ♀, 21–22 mm. Head whitish. Palpi 1 and a half; fuscous. Antennae fuscous or grey; extreme base whitish; in male with fine short pectinations, from which arise tufts of cilia (2). Thorax grey. Abdomen whitish-grey. Legs fuscous with whitish rings; posterior pair except tarsi mostly whitish. Forewings triangular, rather broad, costa gently arched, apex rounded-rectangular, termen slightly rounded, slightly oblique; white with patchy grey suffusion and a variable amount of dark fuscous sprinkling; tufts rather large, fuscous, second and third approximated, a fourth whitish tuft in middle of disc slightly beyond third; extreme base of costa with dark fuscous and grey suffusion; a dark fuscous dot on one-fourth costa connected with second tuft, from which a fine incomplete line proceeds towards two-thirds dorsum; a similar spot on midcosta touching third tuft; median area sometimes densely suffused with dark fuscous and grey; postmedian line dark fuscous, dentate, usually very distinct, from median costal spot, subcostal to three-fourths, thence transverse or slightly oblique, below middle curved inwards to two-thirds dorsum, sometimes indented above margin; sub-terminal more or less suffused, with irregular subcostal and median posterior prominences; terminal edge usually whitish with dark fuscous dots; cilia grey more or less distinctly barred with whitish. Hindwings and cilia grey.

Variable, but may be distinguished by its short fuscous palpi, rather broad forewings, and whitish fourth tuft, which is however not conspicuous, and may be absent from abrasion.

QUEENSLAND: Maryland near Stanthorpe in February; five specimens (W. B. Barnard). Type in Queensland Museum.

15. CELAMA PLEUROSEMA n.sp.

πλευροσημος, with costal mark.

♂, 18 mm. Head and thorax dark grey. Palpi 1 and a half; dark fuscous, upper edge dark grey. Antennae grey; in male with fascicles of cilia (1 and a half). Abdomen grey. Legs fuscous with whitish rings; posterior pair except tarsi mostly whitish. Forewings narrow, triangular, costa moderately arched, apex pointed, termen straight, strongly oblique; grey with dark grey streaks on veins; markings dark fuscous; tufts fuscous, third tuft median; a costal dot at one-fourth, connected with second tuft an elongate median dark costal mark touching third tuft; postmedian reduced to a series of minute dots on veins, from beneath two-thirds costa, moderately outwardly curved, oblique from middle to three-fifths dorsum; cilia grey. Hindwings and cilia pale grey. Recognised by its short fuscous palpi, narrow forewings, sombre colour and elongate costal mark.

QUEENSLAND: Toowoomba in September; one specimen (W. B. Barnard). Type in Queensland Museum.

16. CELAMA CELAENEPHES n.sp.

κελαινεφης, darkly clouded.

♂, 16 mm. ♀, 24 mm. Head and thorax dark fuscous. Palpi 1 and a fourth; dark fuscous; ciliations in male one-half. Abdomen pale grey; dorsum of four central segments dark fuscous. Legs dark fuscous with whitish tarsal rings; posterior tibiae grey. Forewings narrow, suboval, costa gently arched, apex pointed, termen slightly rounded, oblique; fuscous with darker markings; tufts small, inconspicuous, third tuft median; costa broadly dark fuscous to one-third; antemedian line from one-third costa, at first transverse, below middle oblique, incurved, ending on one-third dorsum; postmedian line from third tuft, very slender, at first subcostal to two-thirds, thence transverse, below middle incurved to two-thirds dorsum; dorsal half of space between lines darkly suffused; cilia fuscous. Hindwings and cilia grey-whitish. The type of this obscure species is not in good condition, but it is very different from any other. The short palpi and very short antennal ciliations of the male or noteworthy.

QUEENSLAND: Injune in January (W. B. Barnard). VICTORIA: Birchip in Feburary (D. Goudie). I have seen another taken at Sea Lake by the latter.

17. CELAMA EUCOMPSA n.sp.

εὐκομψος, neat.

♂, 14 mm. Head white. Palpi 1 and a half; pale fuscous. Antennae grey, basal joint white; in male with fascicles of cilia (2). Thorax and abdomen grey. Legs grey; anterior pair fuscous; tarsi with whitish rings. Forewings narrowly triangular, costa moderately arched, apex rounded, termen lightly rounded, strongly oblique; white with slight grey irroration; markings fuscous, clearly defined; tufts fuscous, first and third small, second large, third tuft median; second tuft connected by a fine strigule with one-third costa, and by a slender sinuate line with one-third dorsum; a dot on midcosta, sometimes touching third tuft; postmedian line commencing beneath two-thirds costa as a transverse dentate dotted line, bent inwards in middle, oblique and incurved to three-fourths dorsum, below middle preceded by a slight parallel line; subterminal suffused and widely interrupted; a terminal series of dots connected by grey suffusion; cilia grey with obscure whitish bars. Hindwings and cilia white.

More neatly marked than *C. elaphropasta,* to which it is allied. It differs in the shorter palpi, narrow forewings with strongly oblique termen, median third tuft, and white hindwings.

QUEENSLAND: Mt. Tamborine in November; one specimen.

18. CELAMA EURAPHES n.sp.

εὐραφης, neatly embroidered.

♀, 18–20 mm. Head and thorax pale grey. Palpi 2; pale grey mixed with white. Antennae whitish-grey. Abdomen pale grey; apices of segments white. Legs white sprinkled with fuscous; tarsi fuscous with white rings. Forewings triangular, costa rather strongly arched, apex subrectangular, termen rounded, slightly oblique; tufts grey, second tuft large, first and third small; an elongate spot on base of costa, touching first tuft; a small grey sub-basal suffusion across mid-disc; a broad curved brownish and fuscous fascia at one-third, its anterior edge sharply defined; several minute blackish costal and subcostal dots beyond this; a similar dot on midcosta, on the anterior edge of an oblong brownish costal spot, giving off a rather suffused broad sinuate line to dorsum beyond middle; subterminal line slender, blackish, commencing on posterior edge of this spot, subcostal for a short distance, then transverse and slightly dentate to below middle, thence angled inwards and again outwards to end on three-fourths dorsum; subterminal brownish, suffused, and roughly parallel; a brownish submarginal line; an interrupted fuscous terminal line; cilia whitish with a slender fuscous median line. Hindwings grey-whitish, cilia whitish.

Roughly similar to *C. fraterna,* but very different in its white forewings with neatly defined markings, and other details.

QUEENSLAND: Brisbane in August, November, and May; three specimens.

19. CELAMA FRATERNA.

Roeselia fraterna Moore, Proc. Zool. Soc. 1888, p.393.

Celama fraterna Hmps. Suppl. i, p.403, pl.23, f.12.

♂ ♀, 14–20 mm. Head grey or whitish. Palpi 2 and a half; fuscous, upper edge grey. Antennae grey; in male with fine short pectinations ending in fascicles of cilia (2). Thorax grey or brownish-fuscous. Abdomen pale grey; apices of segments and tuft sometimes whitish. Legs whitish sprinkled with fuscous; tarsi fuscous with whitish rings. Forewings triangular, costa slightly arched, more strongly towards apex, termen slightly rounded, slightly oblique; whitish suffused with brownish grey; tufts grey, second and third large, third tuft beyond middle; often a brownish-grey basal patch; a brownish-grey costal patch at one-fourth, connected with second tuft, from which a brownish-grey fascia runs to one-third dorsum; a brownish-grey costal spot touching third tuft; postmedian line slender, dark fuscous, commencing near this spot, subcostal for a short distance, then transverse and slightly dentate, sometimes reduced to dots, below middle inwardly curved to four-fifths dorsum, sometimes with a posterior tooth above margin, preceded by more or less brownish-grey suffusion forming a more or less distinct fascia; subterminal suffused and indistinct; sometimes a submarginal or terminal series of dots; cilia grey with darker bars. Hindwings grey, towards base paler; cilia grey-whitish. Although somewhat variable, this common species has an unmistakable facies.

NORTH AUSTRALIA: Darwin. NORTH QUEENSLAND: Cairns. QUEENSLAND: Yeppoon; Bundaberg; Gayndah; Nambour; Brisbane; Tweed Heads; Toowoomba; Carnarvon Range; Milmerran; Stanthorpe. NEW SOUTH WALES: Sydney. Also from INDIA.

20. CELAMA VAN HASSELTI.

Nola van hasselti Heyl., C. R. Soc Ent. Belg. 1892, p.44.

Nola ceylonica Hmps., Ill. Het. ix, p.88, pl.158, f.13.

Sorocostia desmotes Turn., Trans. Roy. Soc. S.A. 1899, p.15.

Celama ceylonica Hmps. ii, p.24.

♂ ♀, 12–17 mm. Head and thorax ochreous-grey-whitish. Palpi 2 and a half; ochreous-grey, upper edge paler. Antennae grey; in male with fascicles of cilia (1 and a half). Abdomen grey. Legs fuscous or grey with whitish rings. Forewings triangular, costa straight or slightly arched to near apex, apex rounded-rectangular, termen slightly rounded, slightly oblique; whitish more or less suffused with pale brown; markings brown and fuscous; tufts fuscous, third tuft beyond middle; basal half of costa more or less suffused with brown and sprinkled with fuscous; antemedian line slender, fuscous, usually incomplete; postmedian line from beneath two-thirds costa, dentate, sometimes reduced to dots, tolerably straight, but indented above dorsum, where it ends near tornus, sometimes preceded by brown suffusion, but not forming a distinct fascia; subterminal line suffused and indistinct; cilia ochreous-whitish with grey bars. Hindwings white often with a minute median grey dot, cilia whitish.

This abundant species differs from *C. fraterna* in the forewings being brown not grey, without fasciae, tufts fuscous, with a differently formed postmedian line, and white hindwings.

NORTH AUSTRALIA: Darwin. NORTH QUEENSLAND: Cape York; Cairns; Innisfail; Palm I.; Townsville; Lindeman I.; Eungella. QUEENSLAND: Gayndah; Noosa; Nambour; Brisbane; Stradbroke I.; Tweed Heads; McPherson Range; Toowoomba. Also from JAVA, CEYLON, and INDIA. Hampson (ii, p.24) made this species a synonym of *C. squalida* Staud., but I doubt the correctness of this indentification.

21. CELAMA PYCNOGRAPHA. n. sp.

πυκνογραφος, thickly marked.

♂ ♀, 14 mm. Head and thorax white with some fuscous suffusion. Palpi in male 2, in female 2 and a half; fuscous, upper edge whitish. Antennae grey, basal joint white; in male with long (2) branching fascicles of cilia. Abdomen pale grey. Legs fuscous with whitish tarsal rings; posterior pair (and in female middle pair) whitish. Forewings suboval, costa strongly arched, apex rounded, termen rounded, slightly oblique; white with slight local fuscous suffusion; tufts grey with some fuscous scales; markings dark fuscous; a strigula preceding first tuft, sometimes connected with base by dark suffusion; an irregularly thickened transverse line touching second tuft, sometimes double and slightly waved, from one-third costa, at first oblique, soon bent to become transverse, again bent and slightly waved to two-fifths dorsum; an irregularly dentate line from third tuft, at first subcostal to near apex, there bent to become subterminal, thickened, suffused anteriorly; a suffused fuscous or grey terminal line; cilia whitish with fuscous or grey bars. Hindwings and cilia whitish.

NORTH AUSTRALIA: Darwin in October and December; two specimens received from Mr. F. P. Dodd.

22. CELAMA MACULIFERA n.sp.

maculiferus, blotched.

♂ ♀, 16–17 mm. Head and thorax white. Palpi 2 and a half; grey, upper edge white. Antennae grey; in male with fascicles of cilia (1 and a half). Abdomen whitish. Legs fuscous with whitish rings; posterior pair whitish. Forewings triangular, costa gently arched, apex subrectangular, termen slightly rounded, slightly oblique; whitish; markings and some irroration fuscous; tufts large, fuscous; second tuft connected with costa, and with dorsum by two spots or blotches variable in size; a large irregular pretornal blotch, its posterior dentate edge representing dorsal portion of postmedian line, of which the costal portion is extremely slender, arising from third tuft, at first subcostal, soon transverse and slightly incurved; subterminal line represented by some patchy suffusion; cilia whitish with sub-basal bars and a slender subapical line. Hindwings and cilia grey-whitish. Variable, but very distinct from any other species.

NORTH QUEENSLAND: Kuranda in September and October; Dunk I. in May; three specimens.

23. CELAMA SPHAEROSPILA n.sp.

σφαιροσπιλος, with rounded spot.

♀, 17–19 mm. Head and thorax white. Palpi 2 and a half; white, outer surface of second joint except apex pale fuscous. Antennae grey, towards base white. Abdomen grey; apices of segments whitish. Legs whitish; anterior femora, anterior and middle tibiae, and all tarsi fuscous with whitish rings. Forewings triangular, moderately broad, costa rather strongly arched, apex rounded, termen slightly rounded, slightly oblique; whitish-grey; tufts grey with some dark fuscous sprinkling; a rounded dark fuscous and grey median sub-basal spot, preceding and touching second tuft, and connected with one-fourth costa; intervals between this and first tuft, and between second and third tufts, white; a very fine interrupted fuscous line from third tuft, at first subcostal for a short distance, then bent to become transverse to middle of disc, thence sinuate to three-fourths dorsum, edged posteriorly by a fine white line; a slender white subterminal line with rounded subcostal, median, and subdorsal prominences; cilia whitish, sometimes with faint grey bars. Hindwings grey-whitish, a slight grey discal mark on end of cell; cilia whitish.

QUEENSLAND: Gladstone in June; Brisbane in August; two specimens.

24. Celama subpallida n.sp.

subpallidus, somewhat pale.

♀, 20 mm. Head and thorax white. Palpi 3; fuscous. Antennae grey, towards base white. Abdomen pale fuscous; apices of segments whitish. Legs fuscous with whitish rings; posterior tibiae whitish sprinkled with fuscous. Forewings rather broadly triangular, costa moderately arched, apex round-pointed, termen nearly straight, oblique; grey-whitish; markings fuscous; costal edge fuscous near base; a short elongate mark from base of costa; a larger median costal triangle; a small costal spot at three-fourths, emitting a slender, nearly straight, crenulate, interrupted line to two-thirds dorsum; an interrupted, somewhat suffused, subterminal line with a rounded, median, posterior prominence; a narrow terminal suffusion with darker terminal dots; cilia whitish. Hindwings pale grey; cilia whitish.

North Australia: Darwin in January; one specimen received from Mr. F. P. Dodd.

25. Celama argentea.

Sorocostia argentea Luc., Proc. Linn. Soc. N.S.W. 1890, p.1078.

Celama argentea Hmps. ii, p.12, pl.18, f.9.

♂ ♀, 15–19 mm. Head white. Palpi 3; pale brownish, upper edge white. Antennae grey, towards base white; in male with fascicles of cilia (3). Thorax whitish grey, anteriorly white. Abdomen grey; tuft whitish. Legs whitish; anterior pair fuscous with whitish rings. Forewings moderately broad, triangular, costa gently arched, apex rounded-rectangular, termen slightly rounded, scarcely oblique; whitish-grey; costa broadly white; tufts pale grey-brownish with some dark fuscous scales, second and third large, third tuft beyond middle; some grey-brownish or fuscous dots and striae on costa; traces of an antemedian line connecting a costal dot at one-third to second tuft, and this with dorsum; a costal dot connected with third tuft; postmedian line fuscous, very slender, from costal spot, subcostal to three-fourths, but often partly obsolete, transverse and sinuate in disc, often reduced to a series of dots, with a tooth above dorsum, on which it ends at three-fourths; subterminal grey or fuscous, slender or suffused, interrupted or reduced to dots; a faint grey interrupted terminal line; cilia grey-whitish with faint basal bars. Hindwings and cilia whitish. Easily recognised.

Queensland: Yeppoon; Brisbane; Tweed Heads.

26. Celama pygmaeodes n.sp.

πυγμαιωδης, tiny.

♂, 10–12 mm. Head and thorax white. Palpi 2; fuscous, upper edge white. Antennae pale grey, towards base white; ciliations in male 2 to 2 and a half. Abdomen pale grey. Legs fuscous with whitish rings; posterior pair mostly whitish. Forewings suboval, costa strongly arched, apex rounded, termen obliquely rounded; white with slight pale fuscous suffusion towards termen; markings dark fuscous; basal tuft white, inconspicuous; middle tuft larger, dark fuscous, connected with costa at one-third, and by a strong nearly straight line with dorsum at one-third, sometimes preceded by a very slender parallel line; third tuft scarcely developed; postmedian line strongly sinuate, faintly indicated or obsolete towards costa; subterminal line irregular, interrupted; cilia whitish with some fuscous scales. Hindwings and cilia pale grey. Characterised by its small size and white suboval forewings with strong almost straight transverse line at one-third.

North Australia: Darwin in December. North Queensland: Kuranda; two specimens received from Mr. F. P. Dodd. I have made the second and larger example, which shows most of the markings better, the type. It has, however, lost its palpi. Only in the first example can the form of the post median line be distinguished.

27. Celama amorpha n.sp.

ἀμορφος, unformed.

♂ ♀, 16–18 mm. Head grey-whitish. Palpi 2; fuscous, upper edge whitish. Antennae grey, towards base whitish, in male with fascicles of branching cilia (2). Thorax grey. Abdomen grey; in one example with dark fuscous median spots on second and third segments. Legs fuscous; posterior pair mostly whitish; tarsi with whitish rings. Forewings narrow, suboval, costa slightly arched, apex pointed, termen obliquely rounded; grey-whitish with some fuscous sprinkling; tufts fuscous, first and third small, second larger, third tuft beyond middle; usual markings almost wholly obsolete; sometimes a slender oblique line from one-eighth costa to second tuft; sometimes a short oblique strigule from midcosta towards third tuft; sometimes a slender longitudinal line on lower edge of cell; some short longitudinal subterminal and terminal streaks; cilia pale grey with some darker scales. Hindwings and cilia grey-whitish.

West Australia: Albany in March; four specimens (W. B. Barnard). Type in Queensland Museum.

28. Celama pleurochorda n.sp.

πλευροχορδος, with costal bar.

♂, 18–20 mm. Head and thorax white or grey-whitish. Palpi 3; fuscous, upper edge grey-whitish. Antennae pale-grey; in male with fascicles of cilia (1 and a half). Legs fuscous with whitish rings; posterior pair mostly whitish. Forewings narrow, triangular, costa straight to two-thirds, thence gently arched, apex rounded, termen obliquely rounded; white with dark fuscous markings; tufts rather large, fuscous, third tuft beyond middle; a well defined broad costal streak from base to third tuft, followed by several costal dots; antemedian line absent; postmedian scarcely traceable, from third tuft obliquely outwards, sharply angled above middle, to end of three-fourths dorsum; subterminal interrupted, anteriorly suffused, posteriorly with strong acute dark teeth; cilia fuscous or grey. Hindwings and cilia whitish. Very distinct. A female from the McPherson Range is much smaller (14 mm.), and does not show the submarginal teeth, but must be referred here.

Queensland: McPherson Range (3,000 ft.) in November; Tweed Heads in August; Toowoomba in October; Maryland near Stanthorpe in December; four specimens (W. B. Barnard). Type in Queensland Museum.

29. Celama lechriotropa n.sp.

λεχριοτροπος, obliquely fashioned.

♀, 15–16 mm. Head white. Palpi 2; grey, upper edge whitish. Antennae whitish. Thorax white or grey. Abdomen pale grey. Legs whitish; anterior pair fuscous with whitish rings. Forewings narrowly triangular, costa gently arched, apex pointed, termen slightly rounded, strongly oblique; white or grey-whitish with fuscous markings; first tuft small, fuscous, second larger, fuscous, third small, whitish, median; a short oblique mark from base of costa; a costal dot at one-fifth; another at two-fifths connected with second tuft, from which a fine line runs to one-third dorsum, together forming a strongly oblique antemedian line; postmedian strongly oblique, from three-fourths costa to two-thirds dorsum, thickened or suffused, dentate, with an acute tooth just above middle, indented above dorsum; subterminal suffused, interrupted, with subcostal, median, and subdorsal posterior prominences; a series of minute terminal dots; cilia grey-whitish sprinkled with fuscous. Hindwings and cilia grey. Distinguished by its small size and narrow forewings, with two strongly oblique parallel lines.

West Australia: Denmark in March and April; two specimens (W. B. Barnard). Type in Queensland Museum.

30. Celama pycnopasta n.sp.

πυκνοπαστος, densely sprinkled.

♂ ♀, 18–20 mm. Head fuscous or grey. Palpi in male 2, in female 2 and a half; fuscous or grey. Antennae grey; in male with fascicles of cilia (2). Thorax fuscous. Abdomen grey. Legs fuscous with whitish rings. Forewings narrowly triangular, costa moderately arched, apex pointed, termen nearly straight, oblique; whitish densely sprinkled with fuscous, appearing grey; tufts mostly fuscous; markings fuscous; a dot on one-fourth costa connected with second tuft, from which a nearly straight line, suffused posteriorly, proceeds to one-fourth dorsum; postmedian commencing with a short strigula from costa on posterior edge of third tuft, subcostal for a short distance, then bent to become transverse and minutely dentate to below middle, thence inwardly curved to end on one-third dorsum; subterminal rather thickly suffused, sometimes interrupted, roughly parallel to postmedian line; a series of pale fuscous terminal dots; cilia whitish with some fuscous scales. Hindwings white with slight grey terminal suffusion; cilia white.

West Australia: Denmark in March; Perth in September and November; Yanchep in September; seventeen specimens.

31. Celama elaphropasta n.sp.

ἐλαφροπαστος, lightly sprinkled.

♂ ♀, 14–19 mm. Head white. Palpi 2 and a half; pale fuscous. Antennae grey, towards base white; in male with fascicles of cilia (2). Thorax and abdomen pale grey. Legs whitish with some fuscous sprinkling; tarsi fuscous with whitish rings. Forewings narrowly triangular, costa gently arched, apex round-pointed, termen slightly rounded, slightly oblique; white lightly sprinkled with fuscous and grey; tufts grey mixed with fuscous; a spot or strigula on one-fourth or one-third costa, connected with second tuft, from which a fine fuscous line runs to one-third dorsum; third tuft beyond middle connected with costa by some fuscous suffusion; postmedian more or less distinctly double, from costa beyond middle to two-thirds dorsum, transverse to below middle, thence inwardly curved, with a posterior tooth above dorsum; subterminal suffused, wavy, indented above middle; some terminal dots; cilia whitish with some fuscous scales. Hindwings and cilia pale grey.

Near *C. pycnopasta*, but with white head and whitish forewings.

NORTH QUEENSLAND: Cooktown in April; Kuranda in June and November; Mackay in June. QUEENSLAND: Nambour in March; twelve specimens, of which only one is a male.

32. CELAMA CATAPHRACTA n.sp.

καταφρακτος, fenced in.

♂ ♀, 13–16 mm. Head white partly greyish-tinged. Palpi 2 and a half; fuscous, upper edge whitish. Antennae grey, near base white; in male with branching fascicles of cilia (2). Thorax and abdomen whitish-grey. Legs whitish; tarsi fuscous with whitish rings; anterior pair fuscous. Forewings suboval, costa moderately arched, apex rounded, termen obliquely rounded; white mostly suffused with pale grey; markings fuscous; tufts grey mixed with fuscous, second and third approximated, third opposite one-third costa; from second tuft proceeds a short line, strongly curved inwards, towards but not reaching one-third dorsum; a slender interrupted dark fuscous postmedian line from costa beyond middle, subcostal to two-thirds, there bent to become slightly outwardly oblique and slightly dentate, below middle curved inwards and slightly dentate to two-thirds dorsum, preceded by a narrowly suffused line posteriorly white-edged; submarginal broadly suffused and roughly parallel to subterminal; cilia whitish, basal half with square pale fuscous bars. Hindwings and cilia grey-whitish.

Differs from *C. elaphropasta* in its smaller size, rather longer palpi, narrower forewings, with third tuft well before middle, peculiar antemedian line, postmedian arising from before midcosta, and chequered cilia.

QUEENSLAND: Brisbane in March; Toowoomba in September, October, February, April, and May; eight specimens.

33. CELAMA LEUCOLOPHA n.sp.

λευκολοφος, white-tufted.

♂, 17–18 mm. Head and thorax white. Palpi 2; white, near base fuscous. Antennae grey, towards base white; in male with branched fascicles of cilia (2). Abdomen grey; apices of segments and tuft white. Legs fuscous with whitish rings; posterior pair mostly whitish. Forewings triangular, costa gently arched, apex round-pointed, termen slightly rounded, strongly oblique; white; markings dark fuscous; tufts white, third tuft median; a basal costal spot; a spot on one-fourth costa, from which a slender transverse line just anterior to second tuft, bent below middle becoming inwardly oblique and wavy to one-fifth dorsum; a midcostal dot touching third tuft; postmedian line from third tuft, at first slender and subcostal, soon bent to become transverse and dentate, above middle bent to become inwardly oblique, indented below middle and above dorsum, where it ends at two-thirds, preceded by a broad belt of fuscous suffusion, or this is wholly fuscous, and so fused with the line; subterminal broadly suffused, with small subcostal and larger median rounded projections, sometimes reduced to a slender line; a terminal series of dots; cilia fuscous-grey with white bars. Hindwings and cilia grey-whitish.

Variable in development of markings. Distinguished by palpi being white except at base, forewings and tufts white, the form of the antemedian and postmedian lines, and the bars on cilia.

QUEENSLAND: Crow's Nest near Toowoomba, in October; Bunya Mts. in November; two specimens.

34. CELAMA CHIONOCRANA n.sp.

χιονοκρανος, with snow-white head.

♂, 20 mm. Head white. Palpi 2; fuscous, upper edge white. Antennae grey, towards base white; in male with fascicles of cilia (1 and a half). Thorax grey, patagia white sprinkled with fuscous. Abdomen whitish-grey; tuft whitish. Legs fuscous with whitish rings; (posterior pair absent). Forewings elongate-triangular, costa moderately arched, apex pointed, termen nearly straight, oblique; whitish with dark fuscous markings; tufts fuscous, third tuft beyond middle; a large spot on base of costa; a strongly marked antemedian line from one-third costa, giving off three short sharp posterior processes above middle, below middle more slender and inwardly curved, with a posterior tooth above dorsum, on which it ends at one-fourth; a costal dot opposite third tuft postmedian line from this dot, subcostal to three-fourths, thence transverse and dentate, curved inwards from middle to three-fourths dorsum, near dorsum preceded by a short parallel line; subterminal line well defined, with subcostal and median projections, ending on tornus; a terminal series of dots; cilia pale grey irrorated with fuscous. Hindwings and cilia grey-whitish. Best recognised by the white head, distinct markings, and peculiar antemedian line.

TASMANIA: Bothwell in February; one specimen (W. B. Barnard). Type in Queensland Museum.

35. CELAMA BATHYCYRTA n.sp.

βαθυκυρτος, deeply curved.

♀, 15 mm. Head white. Palpi 2 and a half; ochreous-whitish, lower edge fuscous. Antennae grey, near base white. Thorax pale grey; tegulae white. Legs fuscous with whitish rings; posterior femora and tibiae mostly ochreous-whitish. Forewings triangular, costa strongly arched, apex rounded, termen rounded, slightly oblique; pale grey to postmedian line; terminal area mostly whitish; tufts pale grey, inconspicuous, third tuft beyond middle; a fuscous dot on one-fourth costa; antemedian line fuscous, very slender, from costa opposite second tuft, curved inwards anteriorly to that tuft, then outwardly oblique, angled below middle and inwardly oblique to one-third dorsum, indented above margin; a dark fuscous median costal spot touching third tuft; postmedian from above third tuft, upper half deeply curved outwards, consisting of dark fuscous dots, becoming continuous towards two-thirds dorsum; subterminal faintly indicated by pale grey suffusion; cilia pale grey. Hindwings whitish cilia pale grey.

Characterised by its ochreous-whitish palpi, broad forewings, and deeply curved postmedian line.

NORTH QUEENSLAND: Cape York in November, one specimen (W. B. Barnard). Type in Queensland Museum.

36. Celama eucolpa n.sp.

εὔκολπος, well curved.

♂, 20 mm. Head white. Palpi 4; fuscous, upper half of second joint white. Antennae grey, towards base white; in male with fascicles of branching cilia. Thorax white, posteriorly tinged with grey. Abdomen grey, towards apex whitish. Legs whitish; anterior pair fuscous with whitish rings. Forewings elongate-triangular, costa rather strongly arched, apex pointed, termen slightly rounded, strongly oblique; white with slight fuscous sprinkling; markings dark fuscous; tufts small, grey with some fuscous scales, third tuft median; a broad mark on base of costa; a costal dot at one-fourth opposite second tuft; a slender line from second tuft towards one-third dorsum, sharply angled inwards; postmedian line commencing on midcosta as a strong subcostal line to three-fourths, from whence it becomes a well-curved series of dots on veins, below middle inwardly oblique, indented above dorsum, on which it ends at two-thirds; no subterminal line, but a series of short streaks on veins in terminal area; some suffused terminal dots; cilia grey with narrow white bars. Hindwings and cilia whitish. Resembles *C. bathycyrta* in its deeply curved postmedian line, but easily distinguished by its different palpi.

Queensland: Bunya Mts. in November, one specimen (W. B. Barnard). Type in Queensland Museum.

37. Celama fasciata.

Minnagara fasciata Wlk. xxxv, p.1903.

Nola nigrifascia Hmps., Ill. Het. viii, p.5, pl.139, f.15; Moths Ind. ii, p.141.

Sorocostia platygona Low., Proc. Linn. Soc. N.S.W. 1897, p.11.

♂ ♀, 22–26 mm. Head white. Palpi 2; white with a few fuscous scales. Antennae grey, towards base white; in male with slender pectinations carrying fascicles of cilia (2 and a half). Thorax white, sprinkled, sometimes densely, with fuscous or brown. Abdomen grey-whitish or whitish; dorsal crests on first and second segments brownish; tuft in male whitish-ochreous. Legs whitish with some fuscous scales; anterior tibiae and all tarsi pale fuscous with whitish rings. Forewings triangular, costa gently arched, more strongly towards apex, apex rounded, termen slightly rounded, slightly oblique; white with brownish and fuscous markings; tufts brownish or grey, third tuft beyond middle; basal area more or less suffused with brownish; a series of fuscous costal dots; antemedian line slender, fuscous, from one-fourth costa, outwardly curved anterior to second tuft, ending on one-third dorsum; some grey suffusion between third tuft and costs; a narrow fuscous fascia from midcosta, edged posteriorly with blackish, outwardly curved, inwardly oblique from above middle to two-thirds dorsum, sometimes partly white towards dorsum; subterminal grey-brownish, suffused, irregularly dentate; a grey-brownish submarginal line; cilia white sprinkled with fuscous. Hindwings and cilia whitish. Very distinct. It agrees with the two following species in the postmedian line being free from dentations.

North Queensland: Cape York; Cairns; Atherton; Townsville; Mackay. Queensland: Tweed Heads. Also from Sula, Borneo, Ceylon, and India.

38. Celama lissosticha n.sp.

λισσοστιχος, smooth-lined.

♀, 19–20 mm. Head white. Palpi 2 and a half; fuscous, upper edge white. Antennae grey; basal joint white. Thorax grey, sometimes mixed with white anteriorly. Abdomen grey; basal tuft fuscous. Legs grey; anterior pair fuscous; all tarsi with whitish rings. Forewings triangular, costa strongly arched, apex rounded, termen slightly rounded, slightly oblique; white partly suffused with grey; markings fuscous; tufts large, grey, third tuft beyond middle; a short strigula from costa just anterior to first tuft; antemedian line at one-third, more or less completely double, partly interrupted by second tuft, straight or slightly outwardly curved; a spot on costa opposite third tuft; postmedian line slender, commencing beneath costa slightly before third tuft, running obliquely between tuft and costal spot, at two-thirds curved downwards to become transverse, below middle curved inwards to two-thirds dorsum, smooth throughout, preceded by a faint subparallel line indented in middle and above dorsum; subterminal slender, interrupted, irregularly dentate; cilia grey faintly barred with whitish. Hindwings and cilia grey-whitish.

North Queensland: Kuranda in May. Queensland: Tweed Heads in January. Three specimens.

39. Celama delograpta n.sp.

δηλογραπτος, clearly marked.

♀, 20 mm. Head white. Palpi 2; fuscous, upper edge whitish. Antennae grey, near base white. Thorax grey-whitish with a transverse median fuscous bar. Abdomen fuscous; apices of segments whitish. Legs dark fuscous with whitish tarsal rings; posterior pair mostly whitish. Forewings triangular, costa strongly arched, apex rounded, termen rounded, moderately oblique; white partly suffused with grey; costal edge near base blackish; a very fine bisinuate blackish line from costa near base to base of dorsum; tufts grey-whitish, third tuft median, somewhat approximated to second; a thick blackish line, outwardly oblique from one-third costa to fold, there acutely angled to one-third dorsum, and produced slightly towards base; postmedian line blackish, from a dot on midcosta, subcostal to two-thirds, there acutely angled to become transverse, below middle inwardly curved to two-thirds dorsum, not dentate; subterminal line pale fuscous with rounded projections above and below middle, somewhat suffused and interrupted; a terminal series of short blackish streaks; cilia grey, bases obscurely barred with whitish. Hindwings and cilia grey-whitish. Easily recognised by its blackish lines.

Queensland: Toowoomba in March; one specimen (W. B. Barnard). Type in Queensland Museum.

40. Celama elaphra n.sp.

ἐλαφρος, light.

♀, 12 mm. Head white. Palpi 2 and a half; grey, upper edge white. Thorax and abdomen pale grey. Legs whitish; anterior pair and all tarsi fuscous with whitish rings. Forewings narrow, suboval, costa gently arched, apex rounded, termen rounded, strongly oblique; white; markings fuscous; tufts fuscous, third tuft median; a short streak on costa from base; costal dots at one-fourth and before middle; antemedian line obsolete; postmedian line indicated by some fuscous suffusion; a subapical spot; smaller submarginal spots below middle and above tornus; cilia whitish. Hindwings and cilia pale grey. May be known by its small size and spotted forewings.

NORTH QUEENSLAND: Kuranda; one specimen received from Mr. F. P. Dodd.

41. CELAMA GONIOTYPA n.sp.

γωγιοτυπος, with angled markings.

♂ ♀, 14–16 mm. Head white. Palpi 3; pale fuscous, upper edge grey-whitish. Antennae grey; in male with fascicles of cilia (1 and a half to 2). Thorax and abdomen pale grey. Legs grey; posterior pair whitish; tarsi fuscous with whitish rings. Forewings narrow, almost lanceolate, costa gently arched, apex pointed, termen almost straight, strongly oblique; grey with patchy white suffusion and dark fuscous markings; tufts fuscous, third tuft at or beyond middle, small; more or less white suffusion beneath costa before middle and before apex; antemedian line very slender, from costa opposite first tuft, very oblique to second tuft, there acutely angled inwards to one-fourth dorsum, sometimes with fine acute dentations; postmedian line from beneath three-fourths costa, with two long acute teeth above middle, thence strongly oblique to three-fourths dorsum, indented above margin; a very oblique streak from costa about middle to third tuft, continued by a white line to postmedian; interrupted blackish longitudinal lines in terminal area; in one example an interrupted blackish line on fold; cilia fuscous-grey with pale basal and median lines. Hindwings and cilia whitish-grey. Very distinct and easily recognised when in good condition.

QUEENSLAND: Stanthorpe in December, January, February, and May; seven specimens (W. B. Barnard). Type in Queensland Museum.

42. CELAMA CYMATIAS n.sp.

κυματιας, billowy.

♀, 13 mm. Head and thorax pale grey. Palpi 2; grey. Antennae grey. Abdomen dark grey. Legs grey; posterior pair whitish-grey. Forewings triangular, costa slightly arched, apex rounded, termen almost straight, oblique; grey sprinkled with fuscous; markings fuscous, broadly suffused; tufts fuscous, third tuft median; two basal dots; antemedian line from one-fourth costa, broadly suffused to below middle, thence slender and inwardly oblique to one-fifth dorsum; a spot on midcosta touching third tuft; postmedian line from beneath two-thirds costa, sharply defined posteriorly, strongly waved to form three rounded projections, above middle, below middle, and on dorsum, anteriorly broadly but irregularly suffused; subterminal paler, broadly suffused, with strong subcostal, median, and tornal projections; a terminal series of dots; cilia grey sprinkled with fuscous. Hindwings and cilia grey. Recognisable by its small size, sombre colouring, and broadly suffused billowy postmedian line.

NORTH QUEENSLAND: Cape York in October, one specimen (W. B. Barnard). Type in Queensland Museum.

43. CELAMA PHAEOGRAMMA n.sp.

φαιογραμμος, darkly inscribed.

♂, 16–18 mm. Head pale grey. Palpi 3 and a half; grey, lower edge fuscous. Antennae grey, paler towards base; in male with fascicles of branching cilia (2). Thorax fuscous, tegulae grey. Abdomen grey.

Legs grey with whitish rings. Forewings narrowly triangular, costa moderately arched, apex pointed, termen slightly rounded, oblique; grey with dark fuscous markings; a short longitudinal streak from base of costa, sometimes widened to reach costal edge; tufts small, dark fuscous, approximated, third tuft before middle; a thick line from base of dorsum to middle, where it joins the subterminal line; second tuft with more or less distinct diverging lines to one-fourth and midcosta; postmedian line from two-thirds costa, more or less dentate, strongly oblique to its junction with the line from base, thence oblique to three-fifths dorsum; fine streaks along veins 2, 3, 4 and 5; subterminal obsolete; cilia grey with slightly darker antemedian bars. Hindwings and cilia pale grey. Distinguished by its long palpi, narrow dark forewings, peculiarly formed postmedian line, and streaks on veins.

Queensland; Toowoomba in April; Stanthorpe in March; Milmerran in August; three specimens. Type in Queensland Museum.

44. Celama eurrhyncha n.sp.

ευῥρυγχος, well-beaked.

♂, 20 mm. Head, thorax, and abdomen grey. Palpi 4; grey. Antennae grey; in male with fascicles of cilia (1 and a half). Legs whitish-grey. Forewings narrow, costa strongly arched near base, thence nearly straight to near apex, termen slightly rounded, strongly oblique; whitish sparsely sprinkled with fuscous; markings fuscous; tufts fuscous, second and third somewhat approximated, third median, a fourth tuft in middle at three-fifths; a dot on one-fourth costa, from which proceeds a slender dentate line, anterior to second tuft, at first almost transverse, below middle oblique to one-third dorsum, indented above margin; a costal dot opposite second tuft, and another median, touching third tuft; postmedian line very slender, from above third tuft, subcostal to three-fourths, there indented, above middle sharply angled, inwardly oblique, and slightly dentate to two-thirds dorsum; subterminal well defined posteriorly, slightly suffused anteriorly, with subcostal and median teeth; some terminal dots; cilia whitish sprinkled with fuscous. Hindwings and cilia whitish. Characterised by its long wholly grey palpi, grey head, thorax, and abdomen, and fourth tuft.

Victoria: Kiata near Dimboola; one specimen received from Mr. C. Borch.

45. Celama biguttalis.

Tribunta biguttalis Wlk. xxxiv, p.1507.

Sorocostia trigonota Meyr., Proc. Linn. Soc. N.S.W. 1886, p.719.

Celama biguttalis Hmps. ii, p.31, pl.18, f.31.

♂ ♀, 16–25 mm. Head and thorax grey or whitish. Palpi 6 to 7; grey. Antennae grey; in male with fascicles of cilia (1 and a half). Abdomen grey-whitish. Legs whitish; anterior pair fuscous with whitish rings. Forewings narrow, elongate-triangular, costa gently arched, apex obtusely pointed, termen slightly rounded, strongly oblique; whitish, sometimes partly suffused with grey; markings fuscous; first and second tufts fuscous, second large, third small, usually grey, at or before middle, approximated to second, sometimes a small grey fourth tuft near angle of cell; a short broad longitudinal streak from base of costa, joined by an oblique strigule from costa near base; no antemedian line; sometimes a slender streak on fold; a suffused patch on costa before middle, including third tuft; postmedian very slender, often partly obsolete, from third tuft, subcostal to three-fourths, there twice sharply toothed, strongly oblique from above middle to three-fifths dorsum, slightly dentate or reduced to dots; submarginal suffused or indistinct, sometimes traversed by dark streaks on veins; cilia grey. Hindwings and cilia whitish, very distinct.

QUEENSLAND: Tweed Heads. NEW SOUTH WALES: Murrurundi. VICTORIA: Melbourne; Beaconsfield; Moe; Yallourn. TASMANIA: Launceston; Zeehan; Strahan.

46. CELAMA CERAMOTA n.sp.

κεραμωτος, like earthenware.

♂ ♀, 25–26 mm. Head white or whitish-grey. Palpi 5; fuscous, lower edge towards base grey-whitish. Antennae pale grey; in male with fascicles of branching cilia (2 and a half). Thorax grey; patagia whitish; tegulae brown. Abdomen ochreous-whitish; basal tufts fuscous. Legs fuscous with whitish rings, posterior pair except tarsi ochreous-whitish. Forewings elongate-triangular, costa gently arched, apex pointed, termen nearly straight, oblique; pale brown with patchy whitish suffusion and dark fuscous markings; tufts dark fuscous, first tuft moderate, second large, third very small, nearly approximated to second, median; a subcostal whitish suffusion from base to one-third; no antemedian line; a broad triangular whitish suffusion from middle of disc to apex; postmedian very slender and much interrupted, subcostal from third tuft to two-thirds, there toothed and indented, then curved inwards and slightly sinuate to two-thirds dorsum; a small fuscous suffusion on costa at three-fourths; a whitish bar just before lower two-fifths of termen, sharply defined anteriorly; cilia grey. Hindwings and cilia whitish-grey. Very distinct.

NEW SOUTH WALES: Ebor in February; two specimens.

3. Gen. SOROCOSTIA Rosen.

Ann. Mag. Nat. Hist. (5), xvi, p.435.

Palpi long or very long. Abdomen without crests. Neuration as in *Celama*. Type, *S. albalis* Wlk.

The absence of abdominal crests seems to be a sufficient distinction from *Celama*. The species appear to form a natural group distinguishable by the oblique white markings on the forewings. The only extra-Australian species, which shows some resemblance in this respect, judging by Hampson's figures, is *Celama tineoides* Wlk. from South Africa.

47. SOROCOSTIA PAROMOEA.

Sorocostia paromoea Meyr., Proc. Linn. Soc. N.S.W. 1896, p.721.

Celama paromoea Hmps. ii, p.30, pl.18. f.20.

♂ ♀, 14–20 mm. Head and thorax white. Palpi in male 4 to 5, in female 6 to 7; white, lower half of external surface fuscous. Antennae grey, towards base white; in male with fascicles of cilia (2). Abdomen and legs whitish. Forewings triangular, costa slightly arched, apex pointed, termen nearly straight, oblique; white; markings grey mixed with fuscous; tufts fuscous, third tuft beyond middle, sometimes grey, approximated to second; antemedian line usually obsolete, from one-fourth costa to one-third dorsum anterior to second tuft, interrupted; more or less costal suffusion extending to second and third tufts; a straight oblique postmedian fascia from three-fourths costa to two-thirds dorsum, sharply defined posteriorly; a terminal fascia narrowing to apex and tornus; cilia white sprinkled with grey. Hindwings and cilia whitish.

North Queensland: Cairns. Queensland: Duaringa; Brisbane; Warwick; Stanthorpe; Miles; Cunnamulla. New South Wales: Murrurundi. West Australia: Denmark.

48. Sorocostia tholera.

Celama tholera Turn., Proc. Roy. Soc. Tas. 1925, p.113.

♂ ♀, 15-20 mm. Palpi 7 to 8. Male antennae with fascicles of cilia (2). Forewing tufts small, grey, second and third approximated, third tuft beyond middle, a small fourth tuft in disc beneath cell at one-fourth.

Queensland: Bunya Mts. Tasmania: Burnie; Wilmot.

49. Sorocostia hesycha.

Sorocostia hesycha Meyr., Proc. Linn. Soc. N.S.W. 1888, p.922.

Celama hesycha Hmps. ii, p.30, pl.18, f.29.

Unknown to me. Palpi 3.

West Australia: Geraldton; Carnarvon.

50. Sorocostia irenica.

Sorocostia irenica Meyr., Proc. Linn. Soc. N.S.W. 1886, p.720.

Celama irenica Hmps. ii, p.29, pl.18, f.28.

Unknown to me. Palpi 4 and a half to 5.

New South Wales: Mt. Kosciusko.

51. Sorocostia leuconephes n.sp.

λευκονεφης, clouded with white.

♂ ♀, 20–24 mm. Head and thorax white. Palpi 6 to 8; pale fuscous or grey, upper edge whitish. Antennae grey, towards base white; in male with tufts of cilia (1 and a half). Abdomen whitish-grey. Legs grey. Forewings elongate-triangular, costa slightly arched, apex pointed, termen slightly rounded, strongly oblique; grey with some white basal suffusion; tufts dark fuscous anteriorly, white posteriorly, second and third tufts somewhat approximated; a basal suffusion sometimes divided into costal and median streaks extending as far as second tuft; a white line from second tuft to beneath third tuft, thence expanding to one-third costa, sometimes including a grey costal dot; an oblique white line from dorsum beyond middle to apex, almost straight to near costa, there deflected and expanded to apex, often enclosing one or sometimes two grey costal dots, anterior edge of this line sharply defined, posterior edge broadly suffused; only a straight dorsal portion of a white subterminal line sometimes present, but often absorbed in suffusion of previous line; cilia white with a broad grey sub-basal line often divided into bars, and a terminal line, which is sometimes double. Hindwings and cilia pale grey.

Differs from *C. albalis* in the longer palpi, and paler forewings with broadly suffused markings, partial or complete absence of subterminal line, and markings of cilia.

New South Wales: Mt. Kosciusko (6,000 ft.) in January (type). Tasmania: Cradle Mt. (2,000 ft.) and Derwent Bridge in January and February. Ten specimens. In my revision of the Tasmanian Lepidoptera (1925) I confused this species with *S. paromoea* Meyr.

52. Sorocostia albalis.

Hypena albalis Wlk. xxxiv, p.1143.

Eromene vetustella Wlk. xxxv, p.1763.

Nola strictalis Zel., Verh. z-b. Ges. Wien, 1872, p.459.

Sorocostia vetustella Meyr., Proc. Linn. Soc. N.S.W. 1886, p.721.

Celama albalis Hmps. ii, p.30.

♂ ♀, 16–20 mm. Head and thorax white. Palpi 3 and a half to 4; grey. Antennae grey; in male with fascicles of cilia (1 and a half). Abdomen pale grey. Legs whitish; anterior pair grey. Forewings elongate-triangular, costa gently arched, apex pointed, termen nearly straight, oblique; white; markings dark ochreous-grey; tufts fuscous, third tuft beyond middle; costa beyond middle suffused with dark ochreous-grey; sometimes a slender oblique line from one-fourth costa to second tuft, from which a slender dentate, often interrupted line runs to one-third dorsum; a broadly suffused fascia from three-fourths costa to mid-dorsum, its posterior edge fuscous and sharply defined, with a tooth on fold; following this a narrow white fascia expanded at apex; submarginal and terminal lines suffused and partly confluent; cilia grey. Hindwings and cilia grey-whitish.

New South Wales: Ebor; Katoomba; Mt. Kosciusko. Victoria: Beaconsfield. Tasmania: Hobart. South Australia: Mt. Lofty.

4. Gen. Idiocyttara nov.

ἰδιοκυτταρος, with peculiar cell.

Differs from *Nola* in the neuration of the forewings. The cell is short (two-fifths), the discocellulars incurved, and their lower angle produced in a long narrow process; vein 3 arises from near its apex, and 4 and 5 short-stalked or connate from its apex. Type *I. tornotis* Meyr. Hampson records two other species, one from Solomon Is., one from India; in both cases from a solitary male type.

53. Idiocyttara tornotis.

Sorocostia tornotis Meyr., Proc. Linn. Soc. N.S.W. 1887, p.923.

Nola tornotis Hmps. ii, p.40, pl.40, f.9.

♂ ♀, 13–16 mm. Head white. Palpi 2; brownish, upper edge white. Antennae grey, near base white; in male with branching fascicles of cilia (3). Thorax whitish-grey. Abdomen whitish-grey; apices of segments and tuft whitish. Legs fuscous with whitish rings; posterior pair mostly whitish. Forewings elongate-triangular, costa gently arched, apex round-pointed, termen slightly rounded, slightly oblique; in male with a suboblong fovea occupying posterior half of cell; white more or less densely suffused with grey; tufts large, brownish-grey with a few fuscous scales, second and third closely approximated, third tuft at two-fifths; a brownish-grey dot on one-fifth costa, connected by a strigule with second tuft, thence continued as an irregular slender line to one-fourth dorsum, but sometimes the dot is not developed; usually a brownish-grey costal dot continuous with third tuft; post-median line commencing from this dot, slender blackish, sometimes interrupted or reduced to dots, subcostal to two-thirds, thence nearly transverse and slightly dentate, bent inwards in mid-disc, and curved to two-thirds dorsum, narrowly edged posteriorly with white; sub-terminal broadly suffused, with subcostal and median posterior prominences; a narrow terminal suffusion with a series of darker dots; cilia whitish with grey median bars. Hindwings and cilia whitish.

QUEENSLAND: Duaringa; Brisbane; McPherson Range; Bunya Mts. NEW SOUTH WALES: Lismore.

5. Gen. NOLA Leach.

Edin. Encycl. ix, p.135; Hmps. ii, p.31.

Palpi porrect, moderate or long. Abdomen with a small dorsal crest on first and often also on second segment. Legs smooth-scaled. Forewings with 2 from two-thirds, 3 from angle, 4 separate, 5 approximated, 6 from beneath upper angle, 7, 8, 10 stalked, 9 absent (coincident with 8), 11 free. Hindwings with 2 from well before angle, 3 and 4 coincident from angle, 5 separate, 12 anastomosing with cell to middle or beyond. Type *N. cucullatella* Linn. A genus of moderate size, but destined to be largely increased; almost confined to Australia and the warmer regions of Asia, Africa and America.

54. NOLA PLAGIOSCHEMA.

Nola plagioschema Turn., Proc. Roy. Soc. Tas. 1938, p.72.

TASMANIA: Waratah; Russell Flats.

55. NOLA NIPHOSTENA.

Sorocostia niphostena Low., Trans. Roy. Soc. S.A. 1896, p.153.

Nola niphostena Hmps. ii, p.42, pl.19, f.19.

Unknown to me.

SOUTH AUSTRALIA: Pt. Victor.

56. NOLA EPICENTRA.

Sorocostia epicentra Meyr., Proc. Linn. Soc. N.S.W. 1886, p.724.

Nola epicentra Hmps. ii, p.43, pl.19, f.11.

Unknown to me.

57. NOLA MELANOGRAMMA.

Nola melanogramma Hmps. ii, p.43, pl.19, f.12.

♀, 20 mm. Head white. Palpi 2; grey, upper edge whitish. Antennae pale grey, near base white. Thorax white sprinkled with fuscous, with a median fuscous spot. Abdomen whitish-grey; crests fuscous. Legs fuscous with whitish tarsal rings; posterior pair mostly whitish. Forewings narrow, triangular, costa slightly arched, apex pointed, termen slightly rounded, strongly oblique; white with sharply defined blackish markings; tufts small, blackish, third tuft median; an oblong spot on base of costa extending to first tuft; antemedian line from one-third costa, incorporating second tuft, thick to middle of disc, thence attenuated, oblique to one-third dorsum, with a posterior tooth above margin; a dot on midcosta continuous with third tuft; postmedian line arising from third tuft, very slender and subcostal for a short distance, then sharply angled, dentate, thickened and obscurely double, inwardly curved to two-thirds dorsum, indented above margin; subterminal widely interrupted; a terminal series of dots; cilia whitish sprinkled with fuscous.

TASMANIA: Bothwell in February, one specimen (W. B. Barnard). The British Museum type is said to be from New South Wales.

58. NOLA OCHROSTICHA n.sp.

ὠχροστιχος, with pale lines.

♂ ♀, 18–20 mm. Head and thorax fuscous-grey. Palpi 1 and a fourth fuscous. Antennae grey in male with fascicles of cilia (1 and a fourth). Abdomen grey or whitish-grey with a dark fuscous suffusion on middle of dorsum; basal crest fuscous-grey. Forewings elongate-triangular, costa straight to middle, thence arched, apex rounded, termen slightly rounded, oblique; grey with dark fuscous and grey-whitish markings; first tuft small, grey, second and third larger, fuscous, third tuft beyond middle; a spot on one-fourth costa, obliquely connected with second tuft, from which an oblique line, edged anteriorly with whitish, runs to one-fourth dorsum; a costal spot continuous with third tuft, and sometimes connected by a streak with first tuft; post-median line from third tuft, subcostal to three-fourths, thence dentate and nearly transverse, sometimes reduced to dots, below middle incurved to three-fourths dorsum, edged throughout posteriorly with whitish; subterminal line suffused, with subcostal and median prominences, edged posteriorly with whitish; a whitish submarginal line, interrupted by fuscous dots, and connected by short streaks with termen; cilia fuscous-grey. Hindwings and cilia grey.

An obscure species. The grey-whitish lines are very slender, and although characteristic, are hardly noticeable in worn examples. The short palpi are an aid to recognition.

QUEENSLAND: Toowoomba in August and October; three specimens (W. B. Barnard). Type in Queensland Museum.

59. NOLA SCABRALIS.

Tribunta scabralis Wlk. xxxiv, p.1509.

Nola scabralis Hmps. ii, p.44, pl.19, f.13.

Hampson makes *N. parallacta* Meyr. and *N. ceraunias* Turn. to be synonyms. The first is a very different species. Its long palpi are a sufficient distinction. With regard to the latter I am doubtful. It does not agree very well with Hampson's description, but the differences may be varietal. Hampson's figure is very poor and not helpful.

NEW SOUTH WALES: Sydney.

60. NOLA CERAUNIAS.

Sorocostia ceraunias Turn. (Misprinted cerraunias), Trans. Roy. Soc. S.A. 1899, p.15.

NEW SOUTH WALES: Sydney.

61. Nola belotypa.

Nola belotypa Hmps., Suppl. i, p.421, pl.24, f.15; Turn., Proc. Roy. Soc. Q. 1915, p.14.

New South Wales: Ebor; Katoomba. A mountain species. The type from the Blue Mountains has unfortunately been spoilt by mould, but I have three good specimens from the other locality.

62. Nola pothina n.sp.

ποθεινος, desired.

♂ ♀, 12–22 mm. Head grey, usually mixed with white. Palpi 2; fuscous. Antennae grey; in male with fascicles of cilia (1 and a half). Thorax grey, sometimes with a slender fuscous transverse median bar. Abdomen grey. Legs fuscous with whitish tarsal rings; posterior tibiae grey. Forewings elongate-triangular, costa gently arched, apex rounded, termen slightly rounded, oblique; whitish more or less suffused with grey; markings dark fuscous; tufts large, fuscous or sometimes partly grey, third tuft median; a costal dot near base; a dot on one-third costa, giving rise to a slender transverse line anterior to second tuft, angled below middle, and oblique to one-fourth dorsum; a costal dot touching third tuft; postmedian line from near third tuft, at first slender and subcostal to three-fourths, thence transverse, acutely dentate, broadly suffused anteriorly, from middle of disc inwardly oblique and strongly incurved to two-thirds dorsum, broadly suffused, with submedian and dorsal projections; subterminal roughly parallel, more or less suffused and interrupted; a terminal series of dots; cilia grey, sometimes with slender whitish bars. Hindwings and cilia grey.

Variable in size, and in some details of marking, but recognisable without much difficulty. The broadly suffused and peculiarly shaped postmedian line is characteristic.

Queensland: Brisbane and Tweed Heads in August; Toowoomba in September and October; Carnarvon Range in December; Stanthorpe in October, November, February, and May. New South Wales: Tenterfield in February; Glen Innes in October; Ebor in December; Murrurundi. Victoria: Mt. Buffalo in February.

63. Nola platyzona n.sp.

πλατυζωνος, broadly girdled.

♀, 21 mm. Head white. Palpi 2; fuscous. Antennae grey. Thorax fuscous. Abdomen grey. Legs fuscous with whitish tarsal rings; posterior tibiae whitish sprinkled with fuscous. Forewings triangular, costa strongly arched, apex rounded, termen slightly rounded, scarcely oblique; whitish densely but unevenly suffused with fuscous; markings dark fuscous; tufts large, grey mixed with fuscous, second and third approximated, third tuft median; a basal costal spot at one-fourth, from which proceeds a strong waved line, anterior to second tuft, to one-third dorsum, its anterior edge finely edged with white in dorsal half; a median costal spot continuous with third tuft, immediately beneath which a broad fascia edged posteriorly with white, and extending anteriorly to antemedian line, runs to dorsum; postmedian line from midcosta, at first slender and subcostal, soon transverse and shortly dentate, below middle bent inwards to join central fascia; subterminal roughly parallel, suffused, with subcostal and submedian posterior projections, towards dorsum edged posteriorly with whitish; a terminal suffusion; termen edged by a slender white line interrupted by fuscous dots; cilia fuscous with narrow white bars. Hindwings and cilia grey. Allied to *N. pothina,* but very different in wing-shape and markings.

QUEENSLAND: Maryland near Stanthorpe in March (W. B. Barnard), one specimen. Type in Queensland Museum.

64. NOLA VEPALLIDA n.sp.

vepallidus, very pale.

♀, 15–20 mm. Head white. Palpi 4; pale brownish, upper edge white. Antennae ochreous-whitish. Thorax whitish-grey. Abdomen ochreous-whitish. Legs whitish-ochreous. Forewings triangular, costa slightly arched, apex rounded, termen straight, slightly oblique; grey-whitish very lightly sprinkled with fuscous; tufts grey with a few fuscous scales, second and third approximated, third beyond middle; antemedian line obsolete or scarcely perceptible, outwardly curved anterior to second tuft; an oblique grey postmedian line from beneath four-fifths costa to three-fifths dorsum, edged posteriorly by a series of minute fuscous dots on veins; cilia grey-whitish lightly sprinkled with fuscous. Hindwings and cilia whitish. Very distinct.

QUEENSLAND: Brisbane in November; Tweed Heads in August; two specimens.

65. NOLA MONOZONA.

Sorocostia monozona Low., Proc. Linn. Soc. N.S.W. 1897, p.11.

Nola monozona Hmps. ii, p.45, pl.19, f.11.

Unknown to me.

SOUTH AUSTRALIA: Mt. Lofty.

66. NOLA PAROXYNTA.

Sorocostia paroxynta Meyr., Proc. Linn. Soc. N.S.W. 1886, p.719.

Nola paroxynta Hmps. ii, p.47, pl.19, f.23.

Unknown to me.

NEW SOUTH WALES: Sydney. VICTORIA: Melbourne.

67. NOLA ANISOGONA.

Sorocostia anisogona Low., Trans. Roy. Soc. S.A. 1893, p.149.

Nola anisogona Hmps. ii, p.47, pl.19, f.14.

Unknown to me.

SOUTH AUSTRALIA: Mt. Lofty.

68. NOLA LECHRIOPA.

Nola lechriopa Hmps., Suppl. i, p.418, pl.24, f.10; Turn., Proc. Roy. Soc. Q. 1915, p.12.

♂ ♀, 14–16 mm. Head and thorax grey. Palpi 3 and a half to 4; grey. Antennae grey; in male with fascicles of cilia (1). Abdomen grey. Legs fuscous with whitish tarsal rings. Forewings narrowly triangular, costa gently arched, apex pointed, termen nearly straight, oblique; grey with fuscous irroration and markings; tufts mostly grey, third tuft median; second tuft connected with one-third costa, and by a slender line with one-third dorsum; post-median from three-fifths costa, subcostal to three-fourths, there bent to become inwardly oblique and shortly dentate, below middle curved strongly inwards, ending on two-thirds dorsum; subterminal broadly suffused and irregularly waved; a suffused terminal line; cilia grey. Hindwings and cilia pale grey.

Recognisable by its comparatively long palpi, narrow forewings, and uniform grey colour.

QUEENSLAND: Brisbane; Stradbroke I.; Tweed Heads; Toowoomba. NEW SOUTH WALES: Brunswick Heads; Sydney.

69. NOLA AENICTIS.

Sorocostia aenictis Meyr., Proc. Linn. Soc. N.S.W. 1888, p.923.

Nola aenictis Hmps. ii, p.45, pl.19, f.15.

Unknown to me.

WEST AUSTRALIA: Geraldton.

70. NOLA PORRIGENS.

Dimona porrigens Wlk. xv, p.1650.

Sorocostia arachneis Meyr., Proc. Linn. Soc. N.S.W. 1886, p.724.

Nola porrigens Hmps. ii, p.46.

NEW SOUTH WALES: Sydney; Jervis Bay. VICTORIA: Beaconsfield.

71. NOLA PARALLACTA.

Sorocostia parallacta Meyr., Proc. Linn. Soc. N.S.W. 1886, p.723.

♂ ♀, 15–22 mm. Head and thorax whitish-grey. Palpi 5 to 6; grey, upper edge whitish-grey. Antennae pale grey; in male with fascicles of cilia (1 and a half). Abdomen pale grey. Legs fuscous with whitish rings; posterior pair grey-whitish. Forewings elongate-triangular, costa gently arched, apex round-pointed, termen slightly rounded, oblique; whitish mostly suffused with pale grey; tufts small, fuscous, third tuft median; antemedian line slender, fuscous, very oblique from one-third costa towards second tuft, transverse and dentate anterior to tuft, curved inwards from middle to one-third dorsum, usually partly or wholly obsolete; an oblique strigule from costa to third tuft; postmedian line slender, fuscous, edged with whitish posteriorly, from one-third costa, but origin usually obsolete, subcostal for a short distance, then transverse, below middle oblique to two-thirds dorsum; subterminal similar but more suffused, obsolete towards costa; some obscure terminal dots; cilia grey. Hindwings and cilia grey-whitish. Pallid and with inconspicuous markings, but not like any other.

NEW SOUTH WALES: Mt. Kosciusko. VICTORIA: Gisborne. TASMANIA: Weldborough; Cradle Mt.; Waratah; Strahan.

72. NOLA PHLOEOPHILA.

Nola phloeophila Hmps., Suppl. i, p.419, pl.24, f.11; Turn., Proc. Roy. Soc. Q. 1915, p.14.

Nola macrorrhyncha Turn., Proc. Roy. Soc. Tas. 1925, p.113.

♂ ♀, 20–27 mm. Head and thorax grey-whitish. Palpi 4 to 6; fuscous, upper edge whitish. Antennae grey, near base white; in male with branching fascicles of cilia (3). Thorax whitish-grey. Abdomen pale grey. Legs whitish; anterior pair fuscous with whitish tarsal rings. Forewings rather narrowly elongate-triangular, costa gently arched, apex pointed, termen scarcely rounded, oblique; whitish unevenly sprinkled with fuscous; markings blackish; tufts blackish, second and third approximated, third tuft before middle; costal edge near base dark fuscous; a short oblique bar from base of costa; an oblique streak from costa at one-fourth to second tuft, from which proceeds a fine dentate line, often interrupted or more or less obsolete, to one-fourth dorsum; often a fine streak joining second and third tufts; postmedian line commencing from a midcostal dot, slender, and outwardly oblique to three-fourths, thence continued by a series of dots describing a wide outward curve, below middle incurved to two-thirds dorsum; subterminal roughly parallel, consisting of a series of longitudinal streaks between veins; a terminal suffusion with some marginal dots or short streaks; cilia grey with some whitish bars. Hindwings and cilia whitish.

This wide-spread species varies more than usual in length of palpi, but is fairly constant in markings and easily recognised.

QUEENSLAND: Brisbane; Toowoomba. NEW SOUTH WALES: Ebor; Murrurundi; Mt. Wilson. TASMANIA: Waratah; Weldborough; Mt. Barrow; Hobart; Mt. Wellington. In Brisbane this is a winter species; in Tasmania it occurs in midsummer.

73. NOLA AULACOTA.

Sorocostia aulacota Meyr., Proc. Linn. Soc. N.S.W. 1886, p.722.

Nola aulacota Hmps. ii, p.46, pl.19, f.21.

♂ ♀, 22–24 mm. Head whitish. Palpi 5 to 6; fuscous or grey, upper edge whitish. Antennae pale grey, towards base whitish; in male with fascicles of cilia (2). Thorax grey; patagia and tegulae whitish. Abdomen whitish. Legs whitish; anterior pair fuscous with whitish rings. Forewings narrowly triangular, costa slightly arched, apex pointed, termen nearly straight, strongly oblique; whitish unevenly sprinkled with fuscous; markings dark fuscous; tufts small, elongate, dark fuscous on costal, white on dorsal edge, third tuft median; traces of an antemedian line angled on second tuft; postmedian line from midcosta, slender, subcostal to three-fourths, thence acutely dentate and nearly straight to mid-dorsum, joined anteriorly by several longitudinal lines; subterminal suffused, nearly straight, crossed by several longitudinal lines, which may run to termen; a terminal suffusion with some darker dots; cilia fuscous, sometimes with whitish bars towards base. Hindwings and cilia white.

VICTORIA: Melbourne; Warragul. TASMANIA: Launceston; Deloraine; Strahan; Mt. Wellington.

74. NOLA CYCOTA.

Sorocostia cycota Meyr., Proc. Linn. Soc. N.S.W. 1886, p.723.

Nola cycota Hmps. ii, p.45, pl.19, f.20.

♂ ♀, 18–23 mm. Head white or whitish-grey. Palpi 2 and a half; grey, upper edge white or whitish-grey. Antennae grey; in male with fascicles of cilia (2). Thorax grey; patagia and tegulae whitish-grey. Abdomen grey-whitish. Legs fuscous with whitish rings; posterior pair whitish. Forewings narrowly triangular; costa moderately arched, apex round-pointed, termen nearly straight, oblique; grey usually more or less sprinkled with whitish; markings fuscous; tufts dark fuscous, first and second large, second and third approximated, third tuft beyond middle; an oblique strigule on base of costa; a dot on one-fourth costa, sometimes connected with second tuft, from which a line runs to one-third dorsum; a dot on midcosta near third tuft; postmedian line slender, dark fuscous, arising from midcostal dot, but origin often obsolete, subcostal to three-fourths, where it is sharply toothed, thence nearly transverse, from above middle oblique to two-thirds dorsum, with a small tooth well above margin; subterminal somewhat suffused, edged posteriorly with whitish, with subcostal and submedian prominences; a terminal series of dots more or less marked; cilia grey. Hindwings and cilia grey-whitish.

New South Wales: Glen Innes; Ebor; Sydney; Katoomba; Jervis Bay. Victoria: Mt. Buffalo; Melbourne; Beaconsfield. Tasmania: Zeehan; Strahan; Queenstown; Derwent Bridge; Coles Bay; St. Marys. South Australia: Mt. Lofty. West Australia: Albany; Denmark.

75. Nola zaplethes.

Nola zaplethes Hmps., Suppl. i, p.418, pl.24, f.9; Turn., Proc. Roy. Soc. Q. 1915, p.13.

♂ ♀, 24–28 mm. Head fuscous-brown. Palpi 1 and a half; fuscous-brown. Antennae pale fuscous; in male with fascicles of cilia (1 and a fourth). Thorax grey-whitish; patagia fuscous-brown. Abdomen whitish. Legs whitish sprinkled with grey; tarsi fuscous with whitish rings. Forewings broad, triangular, costa strongly arched, apex rounded-rectangular, termen slightly rounded, scarcely oblique; white partly suffused with pale grey; first tuft whitish, second and third grey, closely approximated, third tuft before middle, a fourth tuft beyond and beneath third, whitish; a broad fuscous-brown streak on costa from base to one-fourth; a fine oblique grey line from costa at one-third to second tuft, from this inwardly oblique and waved to one-fourth dorsum; four blackish dots on middle third of costa, beneath them some grey suffusion; postmedian line grey, slender, arising from the last of these dots, outwardly oblique, broadly curved in mid-disc, indented below middle, thence oblique to two-thirds dorsum, a thick black line from three-fourths costa, outwardly curved, ceasing below middle near termen; a blackish costal dot closely follows this line; some terminal grey suffusion; cilia grey with some white bars. Hindwings and cilia whitish. Very distinct. This amended description is given from specimens in good condition.

Queensland: Mt. Tamborine and Bunya Mts., in November.

76. Nola robusta n.sp.

robustus, strong.

♂ ♀, 21–28 mm. Head white. Palpi 2; pale grey. Antennae grey, basal joint white; in male with fascicles of cilia (1). Thorax grey with a postmedian pair of fuscous dots. Abdomen grey-whitish; dorsal crest grey. Legs fuscous with whitish rings; posterior pair whitish with fuscous tarsal rings. Forewings triangular, costa slightly arched, apex rounded-rectangular, termen slightly rounded, scarcely oblique; whitish unevenly suffused with pale grey; markings dark fuscous; tufts large, grey, second and third approximated, third tuft median; a dark strigule or dot on costa before first tuft; antemedian line slender, oblique, from one-fourth costa to second tuft, thence inwardly oblique and outwardly angled to one-fourth dorsum; an oblique strigule from costa to second tuft; postmedian line double filled in with grey, from costa just beyond third tuft, obliquely outwards to three-fourths, thence sinuate and inwardly oblique to dorsum beyond middle; subterminal represented by a grey spot on costa, a blackish subapical dot, sometimes double, and a short erect line from tornus; a terminal series of blackish dots; cilia grey. Hindwings and cilia grey-whitish.

Characterised by its robust build, postmedian and subterminal lines, and twin-spotted thorax.

QUEENSLAND: Noosa in October; McPherson Range (3,000 ft.) in March; Tweed Heads in January; Toowoomba in February; fourteen specimens.

77. NOLA EURYLOPHA n.sp.

εὐρυλοφος, with broad tufts.

♀, 26–30 mm. Head whitish-grey. Palpi 2; grey. Antennae grey. Thorax grey; patagia sometimes whitish-grey. Abdomen whitish; dorsal crests, which are larger than usual, grey. Legs whitish sprinkled with fuscous; anterior and middle tarsi fuscous with whitish rings. Forewings elongate-triangular, costa slightly arched, apex rounded-rectangular, termen rounded, scarcely oblique; grey with fuscous and brown markings; tufts large, grey, second and third closely approximated, third tuft beyond middle, a fourth tuft at two-thirds just below middle of disc; a costal dot before second tuft, giving rise to a short slender streak towards middle of base; a series of costal dots; antemedian line from one-fourth costa, slightly oblique and outwardly curved to fold, where it divides into two branches, the first to one-fourth dorsum, the second running along fold for a short distance, and then angled to mid-dorsum; a short streak from midcosta to third tuft; postmedian line very slender, from costa above third tuft, subcostal to two-thirds, thence nearly transverse and irregularly waved to below middle, where it is curved strongly inwards to below fourth tuft, ending on one-fourth dorsum, sometimes connected by a line with posterior branch of antemedian; subterminal line brownish, broadly suffused, with strong posterior prominences above and below middle; a narrow grey submarginal suffusion, connected by dots with termen; cilia whitish sprinkled with fuscous. Hindwings and cilia whitish.

WEST AUSTRALIA: Yanchep, in September; Perth; two specimens.

78. NOLA ZOSTRICA n.sp.

ζωστρικος, girdled.

♂, 22 mm. Head and thorax white. Palpi 2 and a half; white sprinkled with fuscous. Antennae grey, basal joint white; in male with fascicles of cilia (1 and a half). Abdomen brownish-grey; tuft white. Legs whitish sprinkled with fuscous; anterior pair and all tarsi fuscous with whitish rings. Forewings elongate-triangular, costa gently arched, apex rounded, termen rounded, oblique; white; tufts small, whitish-grey, second and third approximated, third tuft before middle; fuscous costal spots near base and at one-third; antemedian line from one-third costa, very slender, fuscous, outwardly curved, incomplete; a narrow grey median fascia, outwardly oblique from costa, angled in mid-disc, thence inwardly oblique, edged posteriorly with blackish dots;

subterminal narrowly suffused, interrupted; a fine interrupted terminal line; cilia white sprinkled with fuscous, with some whitish bars. Hindwings and cilia whitish. Very distinct.

North Queensland: Lake Barrine, Atherton Tableland, in June; one specimen.

79. Nola goniophora n.sp.

γωνιοφορος, marked with angles.

♂ ♀, 28–32 mm. Head and thorax grey. Palpi 3; grey or brownish-grey. Antennae grey; in male with fascicles of cilia (1 and a fourth). Abdomen grey-whitish; crests grey. Legs whitish sprinkled with grey; anterior pair and all tarsi fuscous with whitish rings. Forewings elongate-triangular, costa gently arched, termen slightly rounded, slightly oblique; grey, paler towards costa; markings fuscous; tufts grey, sometimes partly fuscous, second and third approximated, third tuft median; an oblique line from costa near base, acutely angled inwards above first tuft, to fold near base; a costal dot at one-fourth, from which runs a slender antemedian line obtusely angled before second tuft, again angled acutely on fold, thence oblique to near one-fourth dorsum; postmedian line from a dot on midcosta, subcostal to three-fourths, thence inwardly curved to below middle, whence it is strongly oblique to fold, on which it is acutely angled and joined by a line with the antemedian, finally acutely angled outwards before ending on two-thirds dorsum; some short streaks on veins in terminal area; cilia grey. Hindwings and cilia grey-whitish.

West Australia: Albany and Denmark in March; Margaret R. in November; three specimens.

6. Gen. Selca.

Wlk. xxxiv, p.1218; Hmps. ii, p.32.

Palpi long. Antennae in male with very long pectinations, near apex simple. Abdomen without dorsal crest. Neuration as in *Nola.* Type *S. latifascialis* Wlk. from Borneo.

An Indomalayan genus of moderate size extending to Africa and South America.

80. Selca brunella.

Rhynchopalpus brunellus Hmps., Ill. Het. ix, p.89, pl.156, f.31.

Nola brunella Hmps. ii, p.34.

Nola achromia Hmps., Suppl. i, p.416.

♂ ♀, 14–16 mm. Head white. Palpi 5 to 6; brown-whitish, upper edge white. Antennae white, towards apex grey-whitish; in male with very slender long pectinations (8), apices simple. Thorax white, posteriorly tinged with brown-whitish. Abdomen and legs whitish. Forewings triangular, costa slightly arched, apex rounded, termen rounded, slightly oblique; white irregularly suffused with pale brownish and sometimes sprinkled with a few fuscous scales; tufts small, whitish, sometimes partly fuscous, third tuft median; antemedian line represented by a series of minute blackish dots sharply angled outwards, but usually the upper limb of the angle is not developed, and often the whole line is obsolete; postmedian line of similar dots, from beneath two-thirds costa to mid-dorsum, with a slight posterior tooth above middle, sometimes this line is obsolete; subterminal suffused, pale brownish, edged posteriorly with white; termen suffused with pale brownish; a terminal series of blackish dots. Hindwings and cilia white.

NORTH QUEENSLAND: Cape York; Cairns; Dunk I. QUEENSLAND: Yeppoon; Brisbane. Also from Ceylon and India.

81. SELCA MAJOR.

Nola major Hmps., Ill. Het. viii, p.48, pl.139, f.13; Suppl. i, p.413.

Nola distributa Hmps. ii, p.36, nec Wlk.

♂, 21 mm. Head and thorax grey-whitish. Palpi 3; fuscous, upper edge grey-whitish. Antennae grey, towards base whitish; antennal pectinations in male very long (8). Abdomen grey. Legs fuscous with whitish rings. Forewings elongate-triangular, costa straight to near apex, apex round-pointed, termen slightly rounded, slightly oblique; grey-whitish; markings dark fuscous; first tuft small, whitish, second and third large, dark fuscous, closely approximated, third tuft median; an oblique strigule from one-third costa to second tuft, from which a fine line runs to one-third dorsum, indented above margin; a suffused costal spot continuous with third tuft; a fine line from third tuft to mid-dorsum; postmedian from beneath two-thirds costa to two-thirds dorsum, sharply dentate; subterminal suffused, interrupted, with subcostal and submedian prominences; a suffused terminal line with some darker terminal dots; cilia whitish sprinkled with fuscous. Hindwings and cilia pale grey.

QUEENSLAND: Duaringa in October (W. B. Barnard). Also from Archipelago, China, India, and Africa. An unusually wide range.

7. Gen. ROESELIA Hb.

Verz., p.397; Hmps. ii, p.51.

Palpi short or moderate, obliquely ascending. Antennae bipectinate, towards apex simple. Abdomen with a small dorsal crest on first segment. Forewings with 2 from four-fifths, 3 from angle, 4 separate, 5 approximated at origin, 6 from below upper angle, 7, 8, 9, 10 stalked, 11 separate. Hindwings with 2 from two-thirds, 3 and 4 stalked, 5 widely separate, 6 and 7 stalked; 12 anastomosing with cell to middle. Type, *R. togatalis* Hb. from Europe. It is doubtful whether Hampson was justified in fixing this species as the type. Meyrick uses *Roeselia* in the place of *Celama* Wlk.

Though poorly represented in Australia, this is a large genus mainly of the tropics in both hemispheres.

82. ROESELIA LUGENS.

Uraba lugens Wlk. xxviii, p.449.

Caesa viduella Wlk. xxxv, p.1729.

Toxoloma australe Feld. Reise Nov. pl.100, f.16.

Selca obscura Swin., Cat. Oxf. Mus. i, p.133.

Nola lugens Meyr., Proc. Linn. Soc. N.S.W. 1886, p. 726.

Roeselia lugens Hmps. ii, p.72.

♂, 23–27 mm.; ♀, 26–34 mm. Palpi 1, slender. Antennae of male with pectinations 5, apical, third simple. Forewings fuscous sprinkled or suffused with whitish; markings dark fuscous; tufts small, grey or fuscous, second and third closely approximated, third tuft before middle; antemedian line from one-third costa to two-fifths dorsum, outwardly curved, more or less waved, sometimes whitish-edged anteriorly; a slender outwardly curved line from before middle of costa to beyond middle of dorsum, sometimes thickened; sometimes a central fuscous suffusion; postmedian from midcosta, sometimes denticulate, outwardly oblique to below middle, there indented, ending on three-fourths dorsum, sometimes edged with whitish posteriorly; subterminal line slender, irregularly dentate. Variable.

North Queensland: Cooktown; Atherton. Queensland: Brisbane; McPherson Range; Toowoomba; Stanthorpe. New South Wales: Ebor; Tyringham; Scone; Sydney; Jervis Bay. Victoria: Melbourne; Beaconsfield; Gisborne; Dunkeld; Birchip. Tasmania: Launceston; Waratah; Bothwell; Hobart. South Australia: Adelaide; Mt. Lofty; Penola. West Australia: Denmark; Perth.

83. Roeselia leucospila.

Uraba leucospila Turn., Trans. Roy. Soc. S.A. 1899, p.16.

Roeselia leucospila Hmps. ii, p.64, pl.20, f.7.

Palpi 1, slender. Unfortunately my two original specimens, including the type, have been destroyed by mould.

North Queensland: Cairns. Queensland: Brisbane.

84. Roeselia metallopa.

Nola metallopa Meyr., Proc. Linn. Soc. N.S.W. 1886, p.726.

Roeselia metallopa Hmps. ii, p.59, pl.19, f.30.

Queensland: Nambour; Brisbane; Stradbroke I.; Tweed Heads; Toowoomba; Stanthorpe. New South Wales: Lismore: Brunswick Heads; Sydney; Jervis Bay. Victoria: Melbourne; Moe.

85. Roeselia mesoleuca.

Corula? mesoleuca Low., Trans. Roy. Soc. S.A. 1903, p.39.

Eurynola mesoleuca Hmps., Suppl. i, p.439.

♂, 22–29 mm. Head white or brown-whitish. Palpi 1 and a quarter; second joint thickened with smoothly appressed scales, terminal joint short, obtuse; dark brown. Antennae grey, in male with long pectinations (5 to 6), apical two-fifths simple. Thorax grey with a posterior white spot; patagia brown, apices dark fuscous. Abdomen whitish more or less suffused with grey. Legs grey-whitish with a few fuscous scales; tarsi fuscous with whitish rings. Forewings triangular, costa straight to middle, thence arched, apex rounded, termen slightly rounded, slightly oblique; grey with fuscous markings and a suffused white fascia; a short bar from costa ending in a tuft at one-sixth; two parallel lines from costa at one-third and shortly beyond, included space filled in with grey, to dorsum before middle; postmedian line very slender, finely dentate, and outwardly oblique to middle of disc, there bent longitudinally inwards, again bent at a right angle and vertical to two-thirds dorsum, a white fascia edged by this line to middle of disc, then expanding beyond it to tornus; subterminal line slender, interrupted, or reduced to dots; cilia pale grey. Hindwings and cilia whitish.

Hampson made the genus *Eurynola* for this species, distinguishing it from *Roeselia* by the separate origin of vein 7 of the forewings; but I find that in five examples this vein is connate with 7, 8, 9 in three, stalked in two.

NORTH QUEENSLAND: Cape York in October and May; Kuranda in October; five specimens. Also from Cooktown.

8. Gen. AEDEMON nov.

αἰδημων, modest.

Face not prominent. Palpi rather short, obliquely ascending; second joint moderately thickened with rough scales; terminal joint very small. Antennae in male bipectinate. Thorax with rough posterior crest. Abdomen without crests. Legs smooth. Forewings with 2 from shortly before angle, 3 from angle, 4 and 5 very closely approximated for some distance, 6 from well below angle, 7, 8, 9 stalked, 7 separating before 9, 10 and 11, separate. Hindwings with cell three-fifths, broad; 2 from three-fourths, 3 and 4 connate, 5 well separate, 6 and 7 stalked, 12 anastomosing with cell to beyond middle.

86. AEDEMON EURAPTA n.sp.

εὐραπτος, neat.

♂, 30 mm. Head and thorax grey. Palpi 1 and a fourth; grey, upper edge fuscous. Antennae grey; pectinations in male 3, extreme apex simple. Abdomen grey-whitish. Legs grey; posterior pair whitish. Forewings elongate-triangular, costa strongly arched; grey with dark fuscous markings; tufts small, second and third approximated, third tuft before middle; antemedian line from one-fourth costa to two-fifths dorsum, strongly outwardly curved, indented above margin; a roughly parallel wavy line from one-third costa to mid-dorsum; several short streaks on bases of veins arising from cell; postmedian line from three-fourths costa to three-fourths dorsum, slender, sharply defined, with an acute tooth beneath costa followed by smaller dentations, partly edged with whitish posteriorly; a faint pale crenulate subterminal line; cilia grey. Hindwings grey-whitish with a narrow fuscous terminal band; cilia whitish.

QUEENSLAND: Stanthorpe in January (W. B. Barnard); one specimen. Type in Queensland Museum.

9. Gen. SPATHOPTILA nov.

σπαθοπτιλος, with spatulate wings.

Face with a smooth rounded projection. Palpi rather short, slender, only slightly rough-scaled, obliquely ascending; second joint scarcely thickened; terminal joint short, slender, pointed. Thorax with a smoothly rounded posterior crest. Abdomen without dorsal crests. Legs smooth. Forewings with 2 from three-fourths, 3 from angle, 4 separate, 5 approximated, 6 from below upper angle, 7, 8, 9 stalked, 7 separating before 9, 10 and 11 separate. Hindwings with cell three-fifths; 2 from three-fourths, 3 and 4 stalked, 5 approximated, 6 and 7 connate, 12 anastomosing with cell to beyond middle. Doubtless allied to *Zia*, with which it agrees in neuration, but there are many points of difference.

87. SPATHOPTILA CYCLOPHORA n.sp.

κυκλοφορος, marked with circles.

♀, 34 mm. Head white. Palpi 1 and a fourth; white. Antennae fuscous, near base white. Thorax whitish-grey sprinkled with fuscous. Abdomen grey-whitish. Legs whitish; anterior tarsi fuscous with whitish rings. Forewings narrow at base, but dilated towards apex, costa strongly arched, apex rectangular, termen slightly rounded, slightly oblique; grey with fuscous markings; tufts fuscous, third tuft median, a fourth tuft near lower angle of cell; a white suffusion on costa near base; antemedian line slender, imperfect; postmedian line slender, distinct, subcostal to two-thirds, where it forms an acute tooth, thence incurved to a strong obtuse median projection, from which it curves inwards to three-fifths dorsum; a circular ring around fourth tuft, followed by two circles forming an oblique figure of 8 in middle of disc; subterminal suffused, sharply and irregularly dentate; cilia grey. Hindwings white, towards apex suffused with grey, cilia white, on apex grey. The type is not in good condition.

WEST AUSTRALIA: Nornalup in November; one specimen.

10. Gen. ZIA Wlk.

xxvii, p.109; Meyr., Proc. Linn. Soc. N.S.W. 1886, p.716; Hmps. ii, p.75.

Face with anterior tuft of scales. Palpi long, obliquely ascending; second joint thickened with rough hairs; terminal joint long (one-half), thickened with rough hairs, obtuse. Antennae in male ciliated. Thorax with strong posterior crest. Abdomen with dorsal crests on first two segments. Forewings with 2 from two-thirds, 3 from angle, 4 and 5 separate, 6 from below upper angle, 7, 8, 9 stalked, 7 separating before 9, 10 and 11 separate. Hindwings with 2 from three-fourths, 3 and 4 stalked, 5 somewhat approximated, 6 and 7 connate, 12 anastomosing with cell to beyond middle. Type, *Z. tactalis* Wlk.

A small tuft of scales is present on the inferior surface of the basal joint of the antennae, as in other genera of this family. Hampson records two species from India and one from Ceylon, but I do not think these should be included in this genus.

88. ZIA TACTALIS.

Zia tactalis, Wlk., xxvii, p.110; Meyr., Proc. Linn. Soc. N.S.W. 1886, p.716; Hmps. ii, p.75.

Palpi 6. Forewings with a small basal tuft, a large tuft in the posterior part of the cell, and another similar beneath the cell, the two latter forming an outwardly oblique interrupted ridge.

QUEENSLAND: Rockhampton; Brisbane. NEW SOUTH WALES: Lismore; Sydney; Jervis Bay. VICTORIA: Sea Lake. WEST AUSTRALIA: Bridgetown.

89. ZIA PLAGIOCHYTA n.sp.

πλαγιοχυτος, obliquely suffused.

♂ ♀, 30–34 mm. Head white. Palpi 2 and a half; brown, upper edge whitish. Antennae grey, basal joint white; in male with fascicles of cilia (2 and a half). Thorax pale grey; patagia and tegulae white. Abdomen grey-whitish. Legs ochreous-whitish; anterior pair fuscous with whitish rings. Forewings elongate-triangular, costa gently arched, apex rounded, termen slightly rounded, oblique; whitish with dark fuscous markings and irroration; a small white basal tuft; two tufts, one in and one beneath cell, forming a continuous dark fuscous slightly oblique ridge just before middle; a strong streak from base beneath costa to two-fifths; antemedian line from one-fourth costa to one-third dorsum, strongly angled before second tuft; a costal spot at two-thirds connected with subcostal streak and second tuft, continued obliquely beyond this to form a central suffusion; postmedian line slender, from three-fifths costa, oblique and denticulate to middle of disc, there angled inwards to two-thirds dorsum; subterminal line dentate, suffused and interrupted, from four-fifths costa, incurved in middle; some short streaks on veins running into termen; cilia fuscous. Hindwings and cilia grey-whitish.

QUEENSLAND: Stanthorpe in March and May. NEW SOUTH WALES: Ebor in March. Type in Queensland Museum.

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OUTLINE OF THE GEOLOGY OF THE MOROBE GOLDFIELDS.

By N. H. Fisher, D.Sc., Mineral Resources Survey, Canberra.

(Plates 1 and 2.)

(*Received 15th June,* 1943; *issued separately, 26th June,* 1944.)

KAINDI SERIES.

The earliest rocks exposed in the Morobe district are the Kaindi series of metamorphics, and these, in one form or another, constitute the host rocks of most of the mineral occurrences. They consist of schists, slates, phyllites, with lenses of limestone and calcareous shales, and are mostly of sedimentary origin, though greenish rocks which are probably metamorphosed igneous tuffs are also found within the series. In places the schists are very micaceous and laminated, but the dominant type is a phyllite composed mainly of quartz granules and scales of micaceous minerals, chiefly biotite, a few plagioclase crystals and varying amounts of chlorite, pyrite, titanite, magnetite, ilmenite and rutile. The effects of shearing are nearly always pronounced and in some cases at least the induced schistosity crosses the original bedding planes of the rock. The limestone lenses are fine-grained and homogeneous, recrystallised to a greater or less extent, and despite extensive search, no trace of fossils has yet been found. The only evidence therefore that exists for the age of the Kaindi series is that it is intruded by pre-Tertiary granite, and from general considerations it is at least as old as Palaeozoic. The structure of the series throughout the Morobe district comprises a series of broad folds trending in a generally northeast-southwest direction. Over much of the central goldfield area this structure is obscured locally by granitic and porphyry intrusives, and the commonest strike direction here is from east-west to southeast-northwest, with a dip generally towards the south or southwest. This metamorphic series forms the basement right through the Mandated Territory, on New Britain and New Ireland as well as the mainland, upon which the later sediments have been deposited. It is not intended to infer that it is all one series throughout, in fact there are evidences at Edie Creek of disconformity between different portions, which, however, are probably closely related in time, and in the Waria area at least of a wider unconformity, so that the basement rocks which so far it has been possible to map only as a metamorphic complex probably were originally deposited in several different stages with possibly diastrophic periods intervening.

MOROBE BATHOLITH.

Intruding the Kaindi Series is the Morobe granodioritic batholith, which occupies extensive areas both to the northeast and southwest of the principal goldbearing district, while smaller outcrops are plentiful within the Bulolo and the Watut valleys (Plates 1 and 2). It reaches to the coast at Salamaua, southeast to the Waria River, and is probably more or less continuous with the granite masses of the central ranges from Ramu to Mount Hagen. Though usually referred to by the field term granite, analyses of numerous thin sections cut from specimens collected at various parts of the intrusion, from the centre out to the margins, shows it to be a slightly acidic granodiorite, or adamellite. Average silica content is just below 70 per cent. Differentiated phases of the mass have produced, especially around the margins, such types as monzonite, diorite, hornblendite, and even a very little pegmatite. This granodioritic mass plays a most important role in the economic geology of the Morobe goldfield and has been the direct source of a considerable proportion of the gold mineralisation. Its age can only be placed with any certainty as pre-Tertiary, for it is overlain by Tertiary sediments and earlier volcanics west of the Watut River, and the conglomerates which comprise part of the Tertiary series contain boulders of the granite. In the Wagi Valley similar granites appear from the scanty evidence available to underlie both Eocene and Cretaceous strata. The intrusion therefore may be as early as late Palaeozoic but it is considered more probable that it took place during Mesozoic times.

TERTIARY SERIES.

West of the Markham and the Watut Rivers, and in fact through most of the Mandated Territory, the old metamorphic complex and the major intrusives are largely masked by extensive series of sediments, very often accompanied by volcanics of various types. These sediments are widely developed and attain great thicknesses during the Miocene and Pliocene, but also include strata of Eocene and Oligocene age, when the volcanic fraction is more strongly represented. In the Central Highlands of New Guinea, Cretaceous and Jurassic beds also occur.

In the Morobe goldfield area and to the east of it on the mainland these marine Tertiaries are not present. They have either been removed by erosion, or, as is more probable, most of this area remained a land mass while Tertiary deposition was proceeding elsewhere. The composition of the Tertiary conglomerates to the west and south and the general distribution of the sediments strongly suggest that their component materials were derived from such a land mass to the east.

EARLY PORPHYRIES.

Within the Bulolo and the Watut valleys the next rocks in point of age to the main granodiorite intrusions are the early porphyries, which are found mainly in the Wau-Edie Creek area. These intrusions comprise well crystallised quartz-biotite porphyries, and appear to have been intruded at some depth below the surface. The Lower Edie porphyry, for instance, outcrops over an area of 7 to 8 square miles, and intense silicification of the invaded Kaindi series has taken place along the margins. In the interior of the intrusion, it is seen in thin sections to be composed of large phenocrysts of quartz, plagioclase and biotite, with abundant hornblende, which is developed more conspicuously in some localities than others. Plagioclase is andesine, usually rather basic, and the ground mass, consisting of felspar, quartz, biotite, hornblende and magnetite, is well crystallised. The phenocrysts are strongly developed, with well defined crystal outlines. This porphyry shows a general lithological similarity both to the earlier granodiorite and to the later biotite porphyries. Towards the margins it becomes finer grained and more siliceous, with abundant pyrite, and strong silicification and pyritization of the slates, together with the appreciable amount of assimilation that has taken place, make it difficult at times to distinguish the exact contact of the porphyry with the metamorphics. Porphyry bodies of this type outcrop in the Lower Edie Creek and Golden Ridges area, also just west of Edie Creek, and at the head of Quombo Creek (Plate 2) and in the Waria River Valley.

LATE PORPHYRIES AND VOLCANICS

Following them, but from their general characteristics much later, are further series of porphyritic intrusions. As most of these are mutually independent, their exact relationships are difficult to determine, but intrusions occurred at two different periods at least, possibly three, all of which must, at present, be considered together. Distinction between them is made more difficult in that they have mostly been affected by hydrothermal alteration in addition to the intense tropical weathering, and exposures of fresh rocks are scarce. A wide difference in the mode of intrusion from that of the Lower Edie porphyry is apparent, and it obviously took place much nearer the surface. They are essentially of much the same composition, quartz, biotite, hornblende and andesine plagioclase, but are not so well crystallised, the ground mass is much finer grained, and their relations to the country rock quite different. Little contact metamorphism can be seen, the principal effect on the host series being pyritization near the contacts, which are often marked by gouge, and nearly always clearly defined except where intensely weathered. On these principles it is probable that the porphyry mass just below the junction of the Edie and the Merri Creeks is earlier than the main intrusion above the junction (Plate 2). Contact breccias, somewhat silicified, are developed along its margins and it seems generally from its appearance in thin section to have been intruded under slightly deeper seated conditions. At about the time of the intrusion of these porphyries violent volcanic activity commenced in the Edie Creek area and vast quantities of agglomerates were produced. Consequent upon this upheaval the whole valley was dammed up, and most of the agglomerates were actually laid down in water, for many of the constituent boulders and pebbles, particularly in the marginal areas of the agglomerate, show a degree of rounding and resorting greater than could have been acquired by mechanical attrition during volcanic ejection. These agglomerates consist not only of andesitic or, more accurately, dacitic volcanic material but also of boulders of the metamorphic series, the granodiorite and the earlier Lower Edie type porphyry. Volcanic breccias were formed presumably by the same explosive outbursts, the distinction between the two being principally that the breccia is composed almost entirely of schist and fragments of the early porphyries, little volcanic material being recognisable. The boulders and rock fragments of which it is composed, too, are more angular although they still show a slight degree of rounding. The constitution of the boulders in the agglomerate and the breccia shows a general relation to the nature of the underlying rocks. Just west of Edie Creek, granite, porphyry and schist are prominent. The breccia above Golden Ridges is composed of slate and Lower Edie porphyry, while down towards the Bulolo River, only porphyry and dacite are found. The inference is that several different volcanic vents existed.

Field relations at Enterprise Mine near Edie Creek and in the Golden Ridges area suggest that the blue breccia is a later phase of the volcanic activity. It overlies the principal agglomerate formation, which in the few places where they are found together appears to pass upward into it without any definite line of demarcation. The agglomerate is much more wide-spread than the breccia, which is confined to a few localities of restricted extent, whereas the agglomerate is found up to several hundreds of feet thick over most of the Lower Bulolo and part of the Watut Valley. In places along the divide between the two rivers, flows of obsidian are associated with the agglomerate, and narrow bands of rhyolite occur similarly in the Golden Ridges area. Indigenous boulders within the agglomerate are essentially similar to the porphyry suite, differing mainly in the fineness of the ground mass, which is cryptocrystalline or even glassy, and in their generally extrusive aspect. Flow structure is sometimes developed, quartz is relatively less abundant, but in sufficient quantities to classify the rock as a dacite. Crystallisation appears to have been well advanced before it reached the surface, as would be expected from its manner of occurrence. A notable feature of these volcanics is the predominance of pyroclastic material and the almost complete absence of flows.

The latest porphyries are intrusive into the volcanic breccia, but it is difficult to establish exactly when effusive activity began. The constituent boulders of the breccia and the agglomerate should establish definitely their place in the igneous sequence, but owing to the close petrological similarity of the porphyries of the different ages, and the generally weathered and altered condition of the breccia where it outcrops, it has not so far been possible to establish more than the fact that the Lower Edie type porphyry is a conspicuous constituent of the volcanics, and no definite proof exists that any other porphyries are present. This problem is made more difficult by the fact that the breccia and the agglomerate are not found very close to the main mineralised area at the head of Edie Creek so that the absence of porphyries of the Upper Edie type from the breccias and agglomerates, if it could be established, would still not be conclusive evidence as to their relative age on account of the geographical interval. For most practical purposes all the late porphyries and the volcanic activity can be considered together as one intrusive epoch.

OTIBANDA SERIES.

After the volcanic outbursts had largely expended their violence the Bulolo-Watut valley area settled down as a more restricted lake system, the limit of which was apparently about the present 3,800-foot contour. In this lake the Otibanda freshwater series of shales, mudstones, sandstones and conglomerates was laid down, several hundred feet in thickness in the central portion, and intercalated near the base with bands of tuff and fine agglomerate representing the last phases of the dying volcanic activity. In these sedimentaries are found the first definite evidence of geological age on the Morobe Goldfield, apart from the Tertiary Langimar series to the west outside the true gold-bearing area. Bones of *Nototherium* were collected from shale and sandstone beds at Otibanda, Upper Watut River, and these were identified by Dr. Charles Anderson (1) of the Australian Museum as similar to those obtained from Pleistocene and recent swamps of South Australia, though certain peculiar features of the jawbone suggested that they might be an earlier type. Numerous plant remains are also present in the series, but it has not been possible to make any age determination from them. The occurrence of *Nototherium*, together with the recent aspect of the Otibanda series, is sufficient to establish this as Pleistocene, so that the principal volcanic activity, the later phases of which are interbedded in the Otibanda series, could not have taken place much earlier than the beginning of the Pleistocene. This means that the later porphyries belong to this period also, as porphyry exactly similar in type to the main late porphyry of the Upper Edie is found intruding the volcanic breccias in the Golden Ridges area. The injection of the late porphyries may, of course, have begun some time before this, but good grounds exist for considering that the whole of this period of activity belongs to Pliocene—early Pleistocene times. The Lower Edie type porphyry is much earlier, but there are no definite data on which to establish its age.

RECENT DEPOSITS.

Deposition of the Otibanda series appears to have been terminated by earth movements which initiated the drainage of the lake and slightly tilted the freshwater beds, a tilting which has been assisted by faulting. A great rush of detrital material from the slopes of Mount Kaindi followed the removal of the lake waters and formed piedmont deposits over much of the south-western side of the Bulolo Valley near Wau. The youngest rocks in the area, apart from recent stream gravels and terraces, are a limited series of rhyolite flows and rhyolite breccias on the surface of the piedmont deposits between Wau and Golden Ridges (Plate 2).

GEOLOGICAL HISTORY.

The chronological sequence in the Morobe goldfields area, as far as at present worked out, is set out in Table 1. Geological events which have taken place elsewhere on the mainland of the Mandated Territory but whose effects are not visible in the goldfields area are shown in the second column*:—

TABLE I.

GEOLOGICAL SEQUENCE IN THE MANDATED TERRITORY OF NEW GUINEA.

Morobe District.	Other Mainland Districts.	Age.
Deposition of the Kaindi Series, probably in several stages with earth movements in between	Generally similar	Palaeozoic ?
Diastrophism, throwing the metamorphics into broad folds, the trends of which have largely determined the present dominant grain of New Guinea	Generally similar	
Intrusion of large masses of granite, granodiorite, &c., not necessarily all contemporaneous. These intrusions are generally elongated parallel to the axes of folding of the metamorphics	Generally similar	Mesozoic ?
Mineralisation derived from the granitic magmas	Generally similar	
Uplift with long-continued erosion	Generally similar	
In the Goldfields area erosion does not appear to have ceased at any time up to the end of the Pliocene, unless all evidence of any intermediate deposition has been entirely removed	Marine deposition of sediments in the Wagi River-Mt. Hagen area and possibly elsewhere in places now entirely covered by Tertiary strata	Jurassic and Cretaceous
	Sedimentation in Central New Guinea, conformable with Cretaceous, and in parts of the Sepik district	Eocene
	Period of folding, initiating the elevation of the present mountain systems, followed by erosion	
Probable time of extrusion of basalts of Upper Kapau, west of the Watut River	Deposition of volcanic agglomerates, basalts, &c., with some limestone and other sediments in the Madang and Sepik districts	Oligocene

	Period of erosion in parts	
	Deposition in the Madang district of Mebu and Mena sedimentary series, separated by unconformity, and of Upper Aitape Series in the Sepik district	Miocene
Intrusion of Lower Edie type porphyries ? Associated mineralisation	Diastrophism, elevation, and in parts only, erosion gap	
Deposition of Langimar Series	Deposition of Finsch Coast Series, Sepik ; and Ouba Series, Madang, in gradually sinking basins	Upper Miocene-Pliocene
Intrusion of late porphyries, in part, and beginning of explosive volcanic outbursts which produced agglomerates and breccias. Establishment of lake system in Bulolo and Watut River Valleys. Mineralisation	Unconformity—diastrophism with intense folding and elevation	
Intrusion of latest porphyries. Principal mineralisation		
Gradual cessation of volcanic activity. Deposition of Otibanda Series in restricted lake. Drainage of the lake accompanied by tilting of the Otibanda Series	Terrestrial, estuarine, shore-line and shallow marine deposits	Pleistocene
Piedmont deposits spread out over Bulolo Valley, north-east of Kaindi	Further elevation and faulting along margins of Markham-Ramu-Sepik Basins	Recent
Local rhyolite flows and rhyolite breccia near Golden Ridges	Small depression and even later uplift	
Deposition of large placer deposits in the lower Bulolo Valley corresponding more or less to the former lake bottom, and formation of alluvial flats and terraces along Watut and Bulolo Rivers and tributaries		

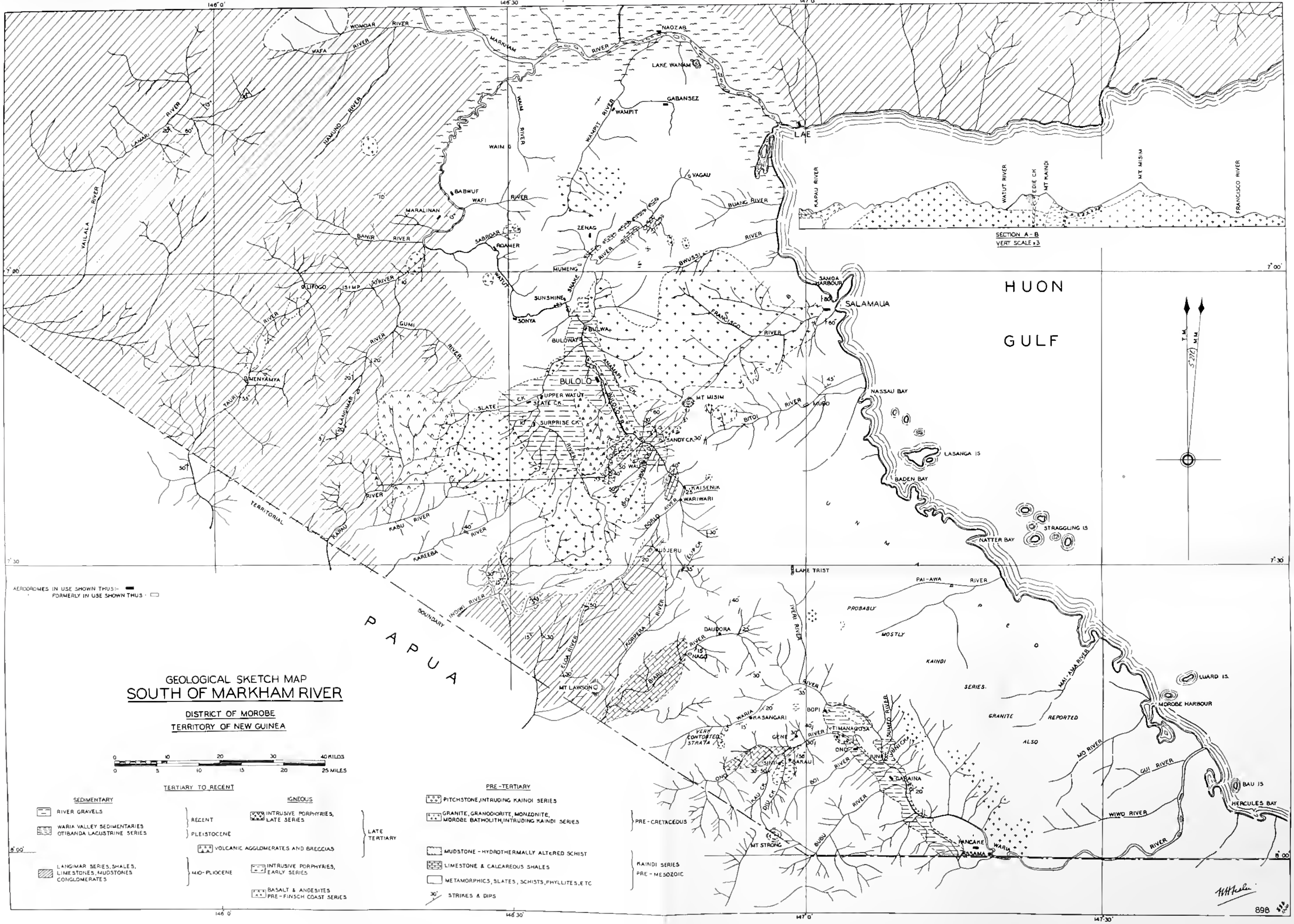
* This Table is compiled partly from the writer's own field work and that of Mr. L. C. Noakes, and partly from published and unpublished reports by the various oil exploration companies, which have operated from time to time in the Mandated Territory.

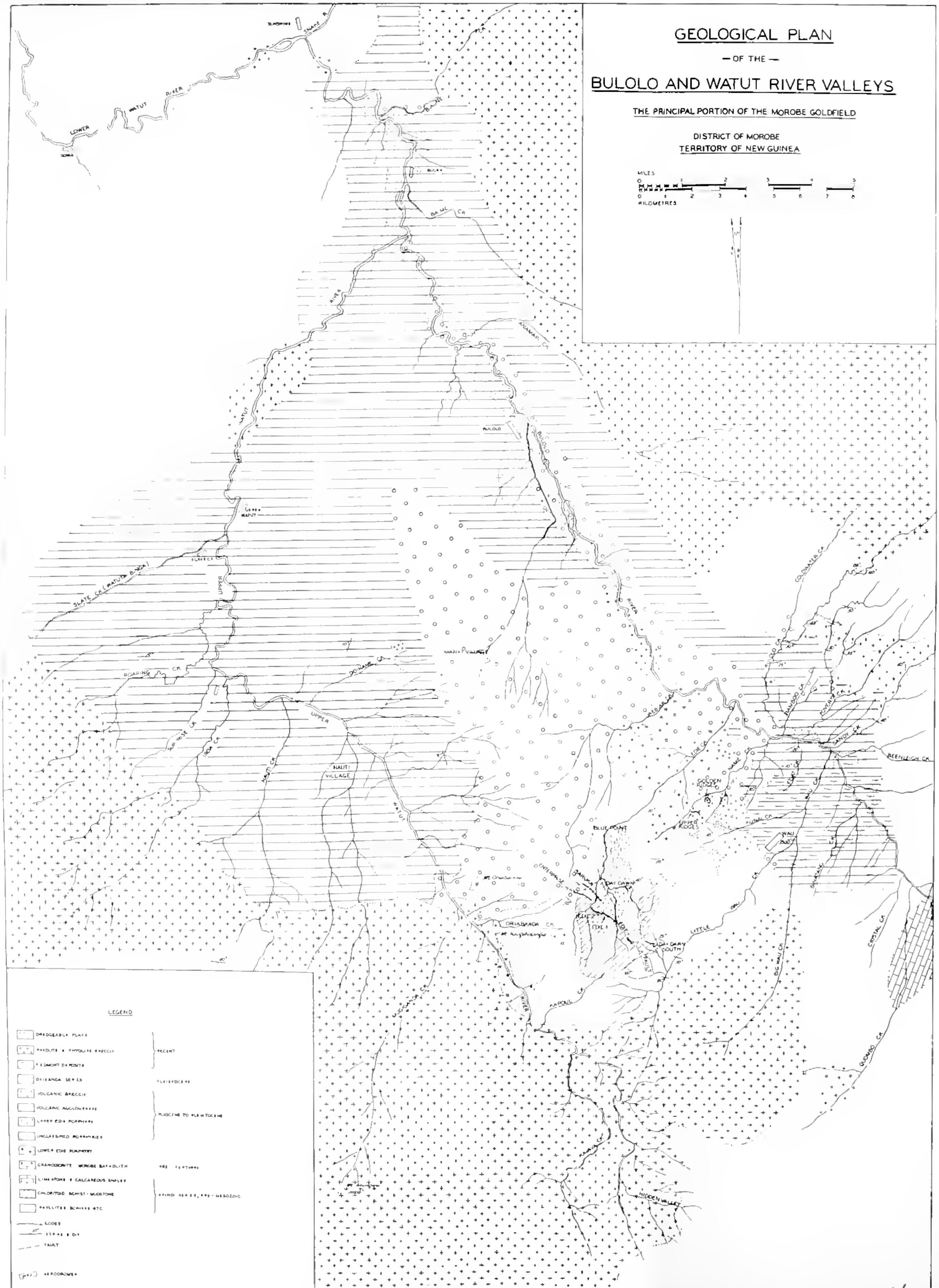
This table is necessarily generalised to some extent, and some of the correlations are only tentative. The absence of the fossiliferous sedimentary beds from the goldfields area makes it impossible to assign definite ages to pre-Pleistocene events. It no doubt took part in the general extreme uplift towards the close of the Pliocene (in Huon Peninsula, north of Lae, Pliocene fossils have been collected 10,000 feet above sea level) and it was probably about this time that the late porphyry intrusions and the associated volcanic activity commenced. It has been seen that vulcanism continued well into the Pleistocene, and it must, in all, have extended over a long period. Conglomerates of the Otibanda series contain gold derived from the mineralisation associated with it, so that sufficient interval must have elapsed for the cover under which this mineralisation took place to have been removed by erosion some time before the completion of the deposition of the lacustrine beds. These lake beds naturally also contain gold from earler periods of deposition and subsequent reconcentration from the conglomerates has contributed materially towards the gold in the recent alluvials. Even before volcanic activity commenced, the present physiographic system had been well established, the volcanics and the subsequent lake beds of the Otibanda series merely filling the deeper portions of the valleys, though the volcanics are also found much higher up the flanks of the mountains. Before their deposition commenced, the topography must have been even more rugged than it is at present.

There seems little doubt that the Pleistocene lake outlet was through the wide, comparatively low Zenag Gap into what is now the Wampit River. This gap was closed by differential elevation during the drainage of the lake and the present stream system of the Lower Watut River established.

REFERENCE.

(1) ANDERSON, C.: Palaeontological Notes No. IV, Records of the Australian Museum, Vol. XX, No. 2, 1937.


GEOLOGICAL SKETCH MAP
SOUTH OF MARKHAM RIVER
DISTRICT OF MOROBE
TERRITORY OF NEW GUINEA
HUON GULF
PAPUA
TERRITORIAL BOUNDARY
SECTION A - B
VERT SCALE x3
AERODROMES IN USE SHOWN THUS:-
FORMERLY IN USE SHOWN THUS:-
TERTIARY TO RECENT
SEDIMENTARY
RIVER GRAVELS
WARIA VALLEY SEDIMENTARIES
OTIBANDA LACUSTRINE SERIES
RECENT
PLEISTOCENE
LANGIMAR SERIES, SHALES, LIMESTONES, MUDSTONES CONGLOMERATES
MIO-PLIOCENE
IGNEOUS
INTRUSIVE PORPHYRIES, LATE SERIES
LATE TERTIARY
VOLCANIC AGGLOMERATES AND BRECCIAS
INTRUSIVE PORPHYRIES, EARLY SERIES
BASALT & ANDESITES PRE-FINSCH COAST SERIES
PRE-TERTIARY
PITCHSTONE, INTRUDING KAINDI SERIES
GRANITE, GRANODIORITE, MONZONITE, MOROBE BATHOLITH, INTRUDING KAINDI SERIES
PRE-CRETACEOUS
MUDSTONE - HYDROTHERMALLY ALTERED SCHIST
LIMESTONE & CALCAREOUS SHALES
METAMORPHICS, SLATES, SCHISTS, PHYLLITES, ETC
KAINDI SERIES
PRE-MESOZOIC
STRIKES & DIPS
LAE
SALAMAUA
BULOLO
WAU
MARKHAM RIVER
MT MISIM
MT LAWSON
MT STRONG
NASSAU BAY
LASANGA IS
BADEN BAY
STRAGGLING IS
NATTER BAY
MOROBE HARBOUR
LUARD IS
BAU IS
HERCULES BAY
PROBABLY MOSTLY KAINDI SERIES
GRANITE REPORTED ALSO
898


GEOLOGICAL PLAN
— OF THE —
BULOLO AND WATUT RIVER VALLEYS
THE PRINCIPAL PORTION OF THE MOROBE GOLDFIELD
DISTRICT OF MOROBE
TERRITORY OF NEW GUINEA
MILES
KILOMETRES
LOWER WATUT RIVER
SNAKE R.
BAIME CR.
ANANDA CR.
BULOLO
RIVER
WATUT
UPPER
SLATE CR. (WATUTA BINGA)
ROARING CR.
UPPER
NAUTI VILLAGE
NAUTI CR.
WATUT
COLOMATA CR.
BAMBOO CR.
SANDY CR.
BEENLEIGH CR.
GOLDEN RIDGES
UPPER RIDGES
BLUE POINT
WAU
DAY DAWN
ENTERPRISE CR.
ORIABARDA CR.
LITTLE WAU CR.
BIG WAU CR.
DAY DAWN SOUTH
KAPOLE CR.
CRYSTAL CR.
QUEMBO CR.
HIDDEN VALLEY
RIVER
LEGEND

CONTRIBUTIONS TO THE QUEENSLAND FLORA, No. 8

By C. T. WHITE, Government Botanist.

(*Received 5th October,* 1943; *tabled before the Royal Society of Queensland, 29th November,* 1943; *issued separately, 26th June,* 1944.)

(Plates III. and IV.)

The present paper contains additions to the flora of Queensland since the publication of the previous Contributions (these Proceedings Vol. 53, pp. 201-228).

Family RANUNCULACEAE.

Ranunculus sceleratus *L.* Sp. Pl. 551 (1753). Celery Ranunculus.

Moreton District: Gold Creek near Brisbane, in wet place associated with *Triglochin* and *Samolus, M. S. Clemens* (flowers) 18-5-1943.

A native of the Northern Hemisphere (North America, Europe and Asia) naturalised in the southern States of Australia but not previously recorded for Queensland.

Family RUTACEAE.

Eriostemon lanceolatus *Gaertn. f.* de Fruct. iii. 154, t. 210 (1807).

E. salicifolius Smith in Rees Cyclop. xiii. No. 1.

Darling Downs District: Pyramid Mt., about 30 miles from Stanthorpe, *H. Jarvis* (flowers) 6-11-1921. Wide Bay District: Fraser Island, *Miss S. Lovell* (fruits) 7-1-1894; Tin Can Bay, very common in restricted area in very sandy soil, *C. T. White* 12284 (flowers) 12-9-1943 (shrub 1–1.5 m., slender upright growth, flowers mauve).

Three definite localities for this species, previously admitted into the Queensland flora by Mueller and Bailey without definite locality records. It is a very common wild-flower of the Hawkesbury sandstone, New South Wales, and one would expect to find it in Queensland towards the Tweed River, in the south-eastern corner of the State. Its occurrence in the Wide Bay district extends our knowledge of its range considerably northwards.

Family MALVACEAE.

Sida Cunninghamii *sp. nov.*

S. pedunculata A. Cunn. ex Benth. Fl. Austr. i. 193 (1863), non Domin.

Suffrutex vel herba perennis, caulibus foliisque dense stellato-tomentosis, canescentibus vel lutescentibus. Folia longe petiolata elliptico-ovata ad lineari-lanceolata apice obtusa vel subacuta, basi obtusa, leviter cordata vel in foliis latioribus manifeste cordata, margine crenulata, supra mollia subtus mollia vel saepe scabriuscula, nervis praecipuis supra impressis, subtus elevatis; petiolus 1-4 cm. longus; lamina 3–6 cm. longa, 1–3 cm. lata; stipulae setaceae 5 mm. longae stellato-tomentosae. Flores in racemos elongatos graciles dispositi vel raro pedunculis unifloris; racemi in longitudine variabili ad 28 cm. longi vel saepe ad 3 cm. reducti; bracteae ad setas 3 subaequales 5–7 mm.

longas reductae (unam folio respondentem et 2 e stipulis ortas). Calyx pilis stellatis dense obsitus, 7–8 mm. diam., 5-lobatus, tubo campanulato, 2 mm. alto, lobis late triangularibus 2·5 mm. longis. Calyx sub fructu leviter amplificatus. Fructus vix 1 cm. diam., depresso-globosus, carpellis dorso valde rugulosis lateribus profunde rugoso-reticulatis 2–2·5 mm. longis.

New South Wales.—Peels Range, *A. Cunningham* (Type: Herb. Kew).

Queensland.—Darling Downs: Hannaford, common on red soil ridges, *C. T. White* 11179 (flowers), 9-6-1938. Maranoa District: Nebine Creek, common, *C. T. White* 11781 (flowers and fruits), 3-4-1941. St. George, *J. Wedd* (flowers and fruits), Feb. 1894; Narine, south-east of Dirranbandi, in damp shady depressions on very sandy loam, only the one specimen seen, *S. T. Blake* 10694 (flowers and fruits), 5-3-1936 (erect, ca. 9 in., leaves subglaucous above, glaucous beneath, flowers yellow); about 30 miles west of St. George, on reddish fine sand in Eucalyptus forest, *S. T. Blake* 10797 (flowers and fruits), 15-3-1936 (stems tufted on a woody base, obliquely ascending up to 6 in. long, leaves dull green above, glaucous beneath, flowers yellow); Roma, alt. ca. 1000 ft., open places in mixed open forest on sandy soil, *S. T. Blake* 13287 (flowers and fruits), 15-2-1938 (tufted, spreading, ascending or erect to ca. 1 ft., leaves somewhat dull green above, glaucous beneath, flowers yellow). Warrego District: Charleville, alt. ca. 1000 ft., in dense Mulga (*Acacia aneura*) forest on orange, very sandy soil, *S. T. Blake* 11058 (flowers and fruits), 5-4-1936 (base woody, stems tufted, up to 1 ft. long, hoary, leaves dull light green above, glacous beneath, flowers yellow); Thargomindah, alt, ca. 400 ft., on stony reddish sandy loam plain in open mulga scrub, *S. T. Blake* 11780 (flowers and fruit remains), 24-6-1936 (base woody, stems oblique up to 1 ft., leaves glaucous above, hoary beneath); Gilruth Plains, east of Cunnamulla, alt. ca. 600 ft., in mulga country on reddish sandy soil, *S. T. Blake* 14036 (flowers and fruits), 19-5-1939 (very hoary perennial, stems erect, branched, up to 1 ft.; inflorescence long, trailing, flowers yellow). Gregory South District: Windorah, on red sand ridge with *Acacia aneura* and *Eucalyptus* spp., *S. T. Blake* 12092 (flowers and fruits), 12-7-1936 (tufted, oblique, glaucous, ca. 6 in.; inflorescence very lax, flowers yellow. Mitchell District: Torrens Creek, *J. E. Young*.

The present species comes closest to *S. pedunculata* Domin non Cunn. The only thing it has in common, however, apart from hoary vestiture, is its inflorescence which varies from simple to compound, in the latter case the branches or pedicels being subtended by three bracts, the two outer of which probably represent stipules, the inner one a much reduced leaf. *S. pedunculata* Domin (at least as far as the Queensland specimens are concerned), I should say is referable to *S. fibulifera* Lindl. This has a much shorter inflorescence and smaller fruits and carpels than *S. Cunninghamii* C. T. White. I would like to have retained Cunningham's name for the species but this was only quoted in synonymy (though accompanied by a few descriptive notes) and Domin's name must therefore stand.

Family Sterculiaceae.

Rulingia pannosa *R. Br.* in Bot. Mag. tab. 2191 (1821).

R. rugosa Steetz ex Bail. in Queens. Agric. Journ. i. 78 (1897), quoad Queensl.

This plant is moderately common in south-east Queensland. The plant recorded by Bailey l.c. as *R. rugosa* belongs here, so the species should be deleted from the Queensland Flora until authentic specimens have been collected.

Rulingia prostrata *Maid. & Betche,* Proc. Linn. Soc. N.S.Wales xxiii. 18 (1898).

Moreton District: Top of Mt. French, flat rock country, *E. J. Smith* (capsules), May, 1942. New for Queensland.

Family HIPPOCRATEACEAE.

Loeseneriella barbata (*F. Muell.*) *comb. nov.*

Hippocratea barbata F. Muell. in Trans. Phil. Instit. Vic. iii., 23 (1859).

Hippocratea obtusifolia Roxb. var *barbata* Benth. Fl. Austr. i. 404 (1863) ; Bailey Queens. Fl. i. 260 (1899).

Moreton District: Simpson's Gap near Brisbane, *J. H. Simmonds* (fruits), Nov. 1887; Brisbane River, *F. M. Bailey, Amalie Dietrich*; Rosewood, *F. M. Bailey, J. Shirley;* Mt. French, *E. J. Smith* (flowers and immature fruits), Jan. 1940 (a creeper). Wide Bay District: Bundaberg, *Jas. Keys*; Imbil, *local Forest Officer.* Port Curtis District: Rosedale, *L. G. Dovey* 222 (flowers), Nov. 1923 (flowers), Oct. 1930 (vine in "bastard scrub"; something appears to eat the young shoots). Cook District: Innisfail, *H. G. Ladbook.*

This species though represented by a number of sheets in the Queensland Herbarium cannot be said to be a common plant. It is typically found in the drier rain-forests or mixed soft-wood forests of the south-eastern parts of the State. The Innisfail plant is somewhat different in general appearance largely on account of its drying brown, instead of the very pale green of all the other specimens. Innisfail is distant from the other localities quoted and the district carries a very different vegetation—heavy tropical rain forest. Our specimen is rather scrappy and when better known may be found distinct. On examination, however, I can find no tangible differences of specific importance. Judging from its distribution it is unlikely the Australian plant would be the same as the Indian one to which Bentham l.c. referred it. Wright's figure (Ic. t. 963) of *Loeseneriella obtusifolia* (Roxb.) A. C. Smith is quoted by A. C. Smith as typical and shows a very different plant to the Australian one. The genus *Loeseneriella* was proposed by Smith (Amer. Journ. Bot. 28, 439, 1941) to separate the Asiatic and Western Pacific plants from the American *Hippocratea* where they had previously been placed.

Salacicratea disepala sp. nov.

Frutex scandens ubique glaber, ramulis subvalidis leviter applanatis sed mox teretibus et lenticellatis. Folia opposita vel subopposita; petiolus validus, supra canaliculatus, subtus convexus, 5–7 mm. longus; lamina chartacea vel tenuiter coriacea, oblonga, elliptica vel fere lanceolata 6–15 cm. longa, 3–6 cm. lata, basi subacuta et in petiolum decurrens, apice obtusa vel obtuse acuta, margine integra sed undulata; costa media utrinque valde elevata, nervi secundarii utrinsecus 8–10; venulae plerumque in sicco subtus prominulae. Inflorescentia axillaris, cymosa, pedunculo communi leviter applanato 1–1.5 cm. longo, ramis secudariis perbrevibus ad 5 mm. longis, bracteis triangularibus 1 mm. longis, pedicellis 2–6 mm. longis. Calyx in alabastro calyptriformis, prominenter apiculatus deinde in sepala 2 fissus. Sepala tenuiter carnosa, suborbicularia, 5 mm. longa, 4 mm. diam. Petala textura sepalis similia, suborbicularia, 4 mm. longa, 3 mm. diam. Discus crasso-carnosus annulari-pulvinatus, 1 mm. altus, indistincte 3–4–lobatus. Stamina 3–4, demum recurvata, filamentis ligulatis, apicem versus gradatim angustatis, 2 mm. longis. Ovarium in disco immersum, stylo pyramidato-conico 1 mm. alto, stigmatibus obscuris. Fructus globosus 1.2 cm. diam, sed in speciminibus nostris immaturus.

Cook District: Yarrabah, *Rev. N. Michael* (old flowers and very immature fruits); Murray River, *H. Flecker* (ex herb. N.Q. Naturalists' Club No. 7826); Etty Bay, rain-forest regrowth, *C. T. White* 11751 (immature fruits), Dec. 1941 (climber); Boonjee, near Malanda, alt. 2,400 feet, common in rain forest, *S. T. Blake* 15188 (type: flowers), August 1943 (slender woody twiner, the lateral branches often twining tendril-like at base, stem about 2 cm. diam., with grey, nearly smooth bark, deep green beneath the surface; wood white; leaves green, paler beneath; flowers greenish white, stamens at first erect, then reflexed).

The present species is extremely interesting as providing a connection between *Salacia* L. and *Salicicratea* Loes. In its early stages the calyx is distinctly calyptrate in appearance but later splits into two equal orbicular sepals which are persistent for some considerable time even after the petals have fallen and the ovary started to fill out. The genus *Salacia* finds its greatest development in tropical America and A. C. Smith, in his revision of the American species (Brittonia 4, 424) remarks that even as far as the American ones are concerned this genus does not form an entirely coherent group, and some of the sections could conveniently form distinct genera. In typical *Salacicratea* the calyx forms a calyptra, dehiscing in an irregular line near the base leaving a narrow ring of calycine tissue below the petals. Dr. A. C. Smith, to whom I submitted a piece of the present plant, thinks it fits into *Salacicratea* and remarks "It is unusual for the calyx of this genus to spread into two sepals and to remain persistent, but I believe that the genus should be expanded to include this species. The true *Salacia,* in my opinion, never has a completely closed calyx in the bud."

In the past *Salacicratea disepala* has been confused with *Salacia prinoides* L. but apart from the calyx the two can be distinguished as follows:—

Inflorescence fasciculate .. .. *Salacia prinoides.*
Inflorescence cymose .. .. *Salacicratea disepala.*

Family Sapindaceae.

Atalaya virens sp. nov.

Arbor parva vel mediocris; ramuli glabri sub lente lenticellati. Folia plerumque 2–juga rarius 1–juga; petiolus et rhachis 3–7 cm. longa, in juventute distincte alata, in statu adulto angulata vel saepe minute alata; foliola lanceolata, basi in petiolum crassum brevem angustata, apice acuta, utrinque in sicco prominenter venulosa, viridia sed subtus pallidiora, 7–12 cm. longa, 1.5–2 cm. lata. Paniculae multiflorae, 8–12 cm. longae, 5–10 cm. latae, ramulis angulatis, tenuiter pubescentibus vel deinde glabris. Flores albi, pedicellis 2–3 mm. longis. Sepala oblonga, glabra, 2 mm. longa. Petala oblonga, 5 mm. longa, extus basi densissime hirsuta vel pubescentes partem superiorem versus gradatim glabra, intus ad basem squama magna cristata ornata. Discus annularis, lobatus. Stamina petalis breviora, filamentis leviter applanatis tenuiter hirsutis. Ovarium profunde triangulare, lobis dorso hirsutis, lateribus glabris. Fructus glaber; loculi ascendentes; carpella prominenter costato-venosa, cum ala 3.5 cm. longa.

Moreton District: Kalbar, *E. J. Smith* (flowers), Oct. 1935; Kilcoy, *C. England* (flowers), Oct. 1919. Wide Bay District: Biggenden, *C. T. White* 7337; Mt. Bauple, on rain-forest slopes, and common as second growth, *C. T. White* 3488 (juvenile stage); Sinai, via Oakview, *F. Reynolds* (old flowers), Nov. 1923 (tree up to 75 ft. high and 2 ft. diam., bark fairly smooth, ½ in. thick, fresh blaze white, flowers in October). Burnett District: Eidsvold, *Dr. T. L. Bancroft* (type); Gayndah, *C. T. White* (juvenile leaves only). Leichhardt District: Dawson River, *Dr. T. L. Bancroft* (old flowers), Nov. 1915; Gogango Range, near Edungalba, in monsoon forest on light brown shallow stony soil, alt. 400-500 ft., *S. T. Blake* 15347 (flowers), 27-9-1943 (tree 20-30 ft. with rather open green crown; trunk with occasional protuberances; bark grey to light grey with numerous transverse ridges, scaly below, smooth above except for fine longitudinal lines, unusually hard, green immediately beneath surface, then dark cream; sapwood white; leaves green to dark green; flowers white). North Kennedy District: Kinrara, alt. 1,900 ft., in closed forest on basalt rock, *S. T. Blake* 14443 (fruits), 25-11-1941 (bushy-headed tree, 10–20 ft., leaves green, bark light grey, smooth to fissured).

This tree is common and widely spread in the mixed soft-wood (closed) forests (''scrubs'') of the near coastal belt of Queensland. The specimens from Toowoomba (Darling Downs District) referred to by Radlkofer (Das Pflanzenreich IV. 165, Sapindaceae, p. 610 under *A. salicifolia* (DC.) Blume) probably belong here. It is a most unlikely locality record for this latter species, which is a native of Timor and North Austraila.

In the past the present species has been confused with *A. hemiglauca* F. Muell. but is easily picked out both in the field and herbarium by its rather bright green leaves and more glabrous character. The two species can be distinguished as follows:—

Leaves 2-5-jugate, glaucous green above, pale green beneath. Sepals tomentose. Petals tomentose. Ovary densely pubescent. Fruit tomentose .. .. *A. hemiglauca.*

Leaves 1-2-jugate, green on both surfaces. Sepals glabrous. Petals pubescent or hirsute in the lower part, glabrous in the upper. Ovary pubescent on the angles, glabrous on the sides. Fruit glabrous .. .. *A. virens.*

Family Leguminosae.

Acacia catenulata *sp. nov.*

Arbor mediocris, ramulis tomentosis, partibus novellis pilis aureis obsitis mox canescentibus. Phyllodia subcoriacea, recta vel falcata, anguste lanceolata ad basin glandulam marginalem plerumque ornata, venis parallelis numerosis et crebris, apice leviter et minute uncinata, basi angustata in petiolum brevem incrassata; lamina 3.5–9 cm. longa, 3–6 mm. lata; petiolus 2 mm. longus, validus, transverse rugulosus. Spicae tenues subdensae vel interruptae, singulae, pedunculatae, cum pedunculo 5 cm. longae. Flores 5–meri. Sepala 5, spathulata, limbo subrotundo ciliato, ungui tenui glabro. Petala libera elliptica 1.5 mm. longa. Legumen 2-6 cm. longum, 2-7-spermum, inter semina valde constrictum plus vel minus planum sed supra semina leviter convexum; valvis chartaceis extus laxe reticulatis; semina longitudinaliter disposita, atro-castanea, funiculo haud plicato tenui sed ad apicem in arillum parvum incrassato.

Maranoa District: Between Mitchell and Morven, common on rocky hills, *C. T. White* 12092 (type, flowers and pods), 6-9-1941 (medium tree, hard somewhat furrowed bark; local name "Bendee," wood in demand for turnery); between Roma and Coogoon *L. Wright* (flowers) 17-3-1936; same locality (juvenile and sterile material only) *C. T. White*, May 1935; 20 miles west of Mitchell, co-dominant with *Cadellia pentastylis* in dense forest on greyish silt loam, alt. 1,600 ft., *S. T. Blake* 10936 (flowers), 31-3-1936 (tree, 30–40 ft., bark grey, compact, slightly fissured, thin, branches oblique, crown rather dense, glaucous, flowers bright yellow; local name "Bendee"). Warrego District: Morven, on timbered rocky sandy hill-top with *Acacia harpophylla* and *Eremophila Mitchellii*, alt. 1,400 ft., *S. T. Blake* 10918 (flowers), 31-3-1936 (tree ca. 20 ft. high with glaucous, rather dense crown; bark grey, furrowed, fibrous-flaky, flowers bright yellow). Mitchell District: Main Range, between Beta and Jericho (flowers), 10-2-1939 (received from Divisional Engineer's Office, Queensland Railways); Lorne Peak, about 50 miles S.S.W. of Blackall, growing among boulders on northern scarp of the Gowan Range, *S. L. Everist* No. 1872 (nearly ripe pods), August 1939 (tree about 20 ft. with slender branches; local name "Bendee").

It is difficult to know whether the present species should be placed in Bentham's series Stenophyllae or Falcatae of the Juliflorae. It has some of the characters of both but as its affinities obviously lie with *A. aneura* F. Muell. and *A. brachystachya* Benth., it is I think best placed in the former series.

The three species can be distinguished as follows:—

Phyllodia straight, thick, coriaceous, 4-8 cm. long, 3-4 mm. broad, sometimes terete, spikes 1.5-2.5 cm. Pods flat, 2.5-4 cm. long, 8-14 mm. broad, seeds oblique or transverse .. .. .. *A. aneura* (Mulga).

Phyllodia narrow-linear, 5-18 cm. long, 1-3 mm. broad; spikes 1.5-2.5 cm. long; pod coriaceous, flattish but biconvex when ripe, straight, broad-linear, 2-8 cm. long, 6-8 mm. broad, seeds longitudinal or oblique .. .. *A. brachystachya* (Umbrella Mulga).

Phyllodia thinly coriaceous, straight or falcate, narrow-lanceolate, 3.5-9 cm. long, 3-6 mm. broad. Spikes 2.5 cm. long. Pod flattish but slightly convex over the seeds, markedly moniliform due to constriction between the seeds, 2-6 cm. long; seeds longitudinal .. .. *A. catenulata* (Bendee).

Family Combretaceae.

Terminalia insularis sp. nov. (Sect. *Myrobalanus*).

Arbor, ramulis validis apicem versus leviter incrassatis. Folia apicem versus ramulorum plus vel minus conferta, subtus molliter pubescentia; lamina obovata, vel elliptico-lanceolata, epunctata, plerumque plus vel minus abrupte et obtuse acuminata, basi cuneata, 8–17 cm. longa, 4.5–9 cm. lata, nervis praecipuis 8–9 in utroque latere, subtus elevatis, venis et venulis prominulis, petioli molliter pubescentes, 1–2·5 cm. longi. Spicae folia aequantes vel superantes densiflorae. Calycis tubus 2 mm. longus, dense sericeo-tomentosus; lobi deltoidei extus pilis albis sparsissime obsiti; intus ad basin pilis longis sericeis densissime obsiti. Stamina 5 mm. longa. Drupa ovoidea vel oblonga, apice breviter cornuta, purpurea, tenuiter pubescens, exangulata, 2 cm. longa, 1 cm. diam.

NORTH QUEENSLAND.—Cook District: Thursday Island, Torres Straits, *F. M. Bailey, E. Cowley.*

HAWAII.—Manoa Arboretum (cultivated) *E. L. Caum* (type: flowers and fruits), 13-10-1940, Herbarium Experiment Station, H.S.P.A., No. 1696.

Photostats of specimens of the present plant were sent me by Mr. Caum some time ago and from these I could not place it satisfactorily. When specimens were received later I went through the Terminalia material in the Queensland Herbarium and found we had specimens (all imperfect) of the same plant in the folders of *T. platyphylla* F. Muell., *T. microcarpa* Dcne. and *T. petiolaris* A. Cunn. Specimens had been seen by Mr. A. E. Exell of the British Museum, who noted it as "aff. *T. petiolaris* A. Cunn." In Bentham's key to the Australian species in the "Flora Australiensis" it could be placed as follows:—

Leaves very obtuse, usually broad .. .. *T. platyphylla.*
Leaves mostly shortly acuminate:
  Leaves three or four times as long as the petiole:
    Pellucid dots very conspicuous under a lens .. .. *T. microcarpa.*
    Pellucid dots quite microscopic .. .. .. *T. insularis.*
  Leaves not twice as long as the petiole:
    Pellucid dots quite microscopic .. .. .. *T. petiolaris.*

Family MYRTACEAE.

Baeckea frutescens *L.* Sp. Pl. 358 (1753).

Cook District: Temple Bay, Cape York Peninsula, sandy plain, *J. E. Young* (leaves only), July 1923.

The above material is in leaf only but is an exact match for much Malayan material seen by me. The record will have to be verified later with flowering specimens.

Baeckea linearis sp. nov.

Frutex glaber ca. 1 m. altus, ramulis subquadrangularibus cortice griseo obtectis, internodiis 2–4 mm. longis. Folia linearia, plana, 5–8 mm. longa, vix 1 mm. lata, ad basin in petiolum perbrevem incrassata. Flores solitarii, breviter pedicellati, pedicello vix 1 mm. longo, ad basin 2 bracteato, bracteis pedicellum leviter excedentibus. Calyx late turbinatus in sicco prominenter 5–angulatus, 2.75 mm. diam., dentibus vel lobis latis. Petala alba 1 mm. diam. stamina 5, calycis lobis opposita, filamentis basin versus applanatis, antherarum loculis longitudinaliter dehiscentibus. Ovarium 3–loculare; ovula in quoque loculo ca. 10 sed saepe 1 loculo abortivo.

NEW SOUTH WALES.—Tweed River, *Jas. Keys.*

QUEENSLAND.—Moreton District: Stradbroke Island, *C. T. White*; Tugun, 66 miles S.E. of Brisbane, in "Wallum" country (*Banksia aemula*, low shrubs, &c.), grey sandy soil (white sand and humus), *C. E. Hubbard* 3894 (flowers) 5-9-1930, distributed from Herbarium, Kew (Eng.) as *Baeckea* sp. near *densifolia* Sm.; Tugun, sandy land edge of large peat swamp, not very common, *C. T. White* 7108 (flowers), 7-9-1930 (slender shrub 0.7–1 m. high, flowers greenish white, very small); Tugun, *G. H. Barker* (type, flowers), Sept. 1940. Wide Bay District: Traveston, mouth of Burrum River, common in sandy soil in the "Wallum" country, *C. T. White* 6333 (old flowers), 6-10-1929 (upright shrub about 1 m. high, flowers white or greenish white); Noosa, *H. A. Longman*; Lake Cootharaba, *Jas. Keys* 66 (slender shrub, on lake beach); Fraser Island, in fine sand, *C. E. Hubbard* 4525 (capsules) 15-10-1930; Fraser Island, *C. T. White sine no.* (flowers), Oct. 1921 (mixed in the herbarium folder with *B. stenophylla* F. Muell.).

The present species is undoubtedly very close to *B. stenophylla* F. Muell. but I found no difficulty in separating it at sight from the abundant material of that species in the Queensland Herbarium. It has also in the past been distributed from the Herbarium, Kew (Eng.) and Herbarium, Brisbane (Aus.) as *B. densifolia* Sm. vel aff. It is a spring flowering shrub, *B. stenophylla* F. Muell. a summer one, though I have seen a few flowers out in August.

The two species can be distinguished as follows:—

Leaves narrow, straight or curved, mostly concave, at least some and frequently nearly all clustered on short lateral branches; oil pustules always visible under a lens. Main flowering period Nov.-Jan. Stamens 8-13 .. .. *B. stenophylla.*

Leaves straight, flat, rather distantly placed along the stem (internodes 2-4 mm. long); oil pustules not visible. Flowers in Sept. Stamens 5 .. .. *B. linearis.*

Baeckea stenophylla F. Muell. Fragm. Phytogr. Aust. i. 12 (1858).

Bentham (Fl. Austr. iii. 80) described the stamens of this species as 5–6 and this was copied by Bailey (Queens. Fl. ii. 585). When examining the large series of specimens of this plant in the Queensland Herbarium I found the stamens to vary from 8–13, 11 being a very common number. Mueller in his original description says "Staminibus 10." The species is very common in the "Wallum" country, south-eastern Queensland (Moreton and Wide Bay Districts).

Callistemon linearis *DC.* Prodr. iii. 223 (1828).

North Kennedy District: Milray, south of Pentland, on sandy sloping banks of Crooked Creek, among low shrubs, *S. T. Blake* 9979 (flowers and fruits), 21-10-1935 (small irregular shrub up to 8 ft., calyx and corolla greenish, stamens crimson).

New for Queensland.

I had at first drawn up a description of the present specimens as a new species and later as a variety of *C. rigidus* R. Br., but on further examination of material in the Queensland Herbarium cannot separate the plant satisfactorily from *C. linearis* DC. This extends the range of the species very considerably as it was only previously known from the Hawkesbury sandstone in New South Wales. It is strange the plant has not been found in any connecting localities, though *C. rigidus* R. Br. comes into Queensland and *C. Chisholmi* Cheel from Central Queensland is apparently very closely allied.

Callistemon pachyphyllus *Cheel* var. **viridis** *Cheel* Proc. Linn. Soc. N.S. Wales l. 261 (1925).

Moreton District: Caloundra, *Miss E. Taylor* (type). Wide Bay District: Ringtail Creek, near Tewantin, *C. T. White* (flowers), March

1923; mainland opposite southern end of Fraser Island, on sandy swampy soil, rare, *S. F. Kajewski* 21 (young fruits), Jan. 1928 (shrub of few erect stems up to 4 ft. high); Fraser Island, *Miss Lovell,* Jan. 1894, *W. R. Petrie* 166, *C. T. White* 1345 (flowers), Oct. 1921, *F. C. Epps* (flowers—main flowering period just passed), Nov. 1922; Traveston, mouth of the Burrum River, only one plant seen in a "Wallum" swamp, *C. T. White* 6322, 6-10-1929 (upright shrub 1 m. high); Wallum, *Jas. Keys* (old flowers), Jan. 1904; Tin Can Bay, common in wet places in "Wallum" flats, *C. T. White* 12293 (flowers), 12-9-1943 (slender upright shrub 1–2 m., simple or little branched towards the top, flowers greenish yellow).

This variety is widely spread but not very common in the Wide Bay District. It is very variable but on the whole is characterised by very narrow leaves; some of those on the Fraser Island specimens measure up to 13 cm. long and only 3 mm. wide.

Callistemon salignus *DC.* var. **roseus** *n. var.*

Flores rosei.

Port Curtis District: Forest Reserve 20, Maryvale, Yeppoon, *E. J. Richter* (flowers), Oct. 1924.

A beautiful pink-flowered variety of this common tree.

Eucalyptus exserta F. Muell. Journ. Linn. Soc. (Lond.) iii. 85 (1859).

E. insulana F. M. Bail. in Queens. Agric. Journ. xvii. 103 (1906).

E. exserta is one of the most widely distributed eucalypts in Queensland. In going through our boxes of *E. resinifera* J. Sm. recently I came across specimens determined as such from Middle Percy Island collected by H. Tryon. These were evidently identical with Bailey's *insulana* and were much better than the specimens from the same collection on which he founded his species. I have no hesitation in placing all the material I have seen under *E. exserta* F. Muell. which is abundant on the adjacent mainland.

Leptospermum phylicoideum (*A. Cunn.*) *Cheel* Journ. & Proc. Roy. Soc. N.S.W. lxxvi. 231, 1943.

Kunzea peduncularis F. Muell. in Trans. Vic. Instit. 1855, 124 and in Hook. Kew Journ. viii. 67 (1856).

Darling Downs District: Lyra, *W. R. Petrie* (old capsules), June 1921; Ballandean National Park, alt. 3,400 ft., in rock crevices, *S. T. Blake,* 14136 (flowers), 29-1-1940 (dense showy, crooked-stemmed shrub, about 6 ft. high, with hard, compact, whitish papery bark, rather green leaves and white flowers).

The species was previously recorded by Mueller in his Second Census for Queensland without definite locality record.

Thryptomene hexandra sp. nov.

Frutex patens, ca. 1 cm. altus, ramulis cicatricibus foliorum delapsorum notatis. Folia linearia, apice mucronata, fere plana vel in sicco supra canaliculata dorso convexa et nigro-punctata, 4–6 mm. longa, 1 mm. lata. Flores numerosi, 1–3 in axillis foliorum superiorum, pedicellis 1 mm. longis, ad apicem 2–bracteolatis sed bracteolis mox deciduis; bracteolae lineares, 2 mm. longae calycis tubum aequantes vel leviter superantes. Calycis tubus anguste urceolaris, profunde 12–costatus ad apicem ovarii leviter constrictus. Sepala 6 alba, suborbicularia, 1 mm. diam. Petala alba suborbicularia 1·5 mm. diam. Stamina 6–8 (plerumque 6 sepali opposita), filamentis brevibus validis; antherarum loculi globosi, connectivo in glandulam globosam producto. Ovarium 1–loculare; ovula 2 erecta, placentae brevi basilari intra loculum parvum ad apicem partis adnatae tubi calycis affixa.

Warrego District: Dynevor Downs, common on dry stony hillsides and ridges, *C. T. White* 11871 (type: flowers), 2-4-1941 (shrub 1 m., spreading habit, flowers white); near Adavale, on a range, *Dr. W. MacGillivray* 955 (flowers), 29-8-1923 (beautiful white-flowered shrub). (These last specimens were distributed from Herb. A. Morris as *T. oligandra* F. Muell. var. *parviflora* F. Muell.)

In its irregular number of stamens the present plant agrees with some species of *Baeckea* but has the persistent petaloid sepals and 1-celled ovary of *Thryptomene*. The stamens are mostly 6 in number but vary from 6–8, in the latter case 1 or 2 being opposite a petal. In botanical sequence the species comes between *T. Mitchelliana* F. Muell. and *T. Miqueliana* F. Muell. but in addition to floral characters differs from both in the narrow, linear not oblong or obovate leaves.

Family RUBIACEAE.

Mitracarpum hirtum (*L.*) *DC.* Prodr. iv. 572 (1830).

Cook District: Cairns, *H. Flecker* (flowers and fruits) 25-6-41, N.Q. Nat. Club, No. 7582.

A native of tropical South America not previously recorded as a naturalised alien in Australia. (Det. by L. S. Smith).

Family COMPOSITAE.

Calotis inermis *Maid. & Betche* Proc. Linn. Soc. N.S.Wales xxvi., 84 (1901).

Warrego District: Goonamurra near Eulo, on hard red soil flats, *S. L. Everist* 1656 (flowers), 20-9-1938 (small erect herb, ray florets purple); Dynevor Downs, on hard dry stony ridges, *C. T. White* 11827 (flowers), 2-4-1941 (herb, flowers mauve).

The above specimens seem to agree well with the description published by Maiden and Betche except that I would hardly call the hairs scale-like, nor would I say the achenes are striate. On this account specimens were forwarded to the National Herbarium, Botanic Gardens, Sydney, where they were examined by Miss Melvaine, who reported that the Queensland plants were entirely conspecific with the only remaining specimen, from close to the type locality, of *Calotis inermis* in their Herbarium, the type having been evacuated. Miss Melvaine states that the achenes certainly do not appear striate, though it is possible that the mature fruits have that appearance. The description of the hairs, she says, presumably refers to their flattened character in the collapsed dried state when they do resemble narrow scales, though they are apparently narrowly conical when fresh.

Olearia glabra sp. nov. (Sect. *Merismotriche*).

Suffrutex glaber, ramosissimus, 0.5 m. altus, ramulis cortice griseo obtectis, junioribus angularibus. Folia sessilia, anguste linearia, plana, apice acuta, basi subobtusa, in sicco leviter rugulosa 1–2 cm. longa, 1–1·5 mm. lata. Capitulae pedunculatae, pedunculis tenuibus 2–3 cm. longis. Bracteae involucri anguste lineares, acutae, interioribus 5 mm. longis, margine scariosae. Involucrum planum. Flosculi radii ca. 12, tubo corollae 4 mm. longo, ligula spathulata 2·5 mm. longa; flosculi disci corollae tubo 3.5 mm., limbo 5–dentato. Achaenia (vix matura) angulata, pubescentia; pappi setis 8 mm. longis.

Warrego District: Dynevor Downs, *C. T. White* 11829 (flowers), 2-4-1941 (intricately branched subshrub, 0.5 m., flowers whitish).

I had provisionally determined the above plant as *O. tenuifolia* Benth. vel aff. but as this species is only known from New South Wales I sent specimens to Mr. R. H. Anderson, Botanist in Charge of the National Herbarium, Sydney, and he replied: "I regret that we have been unable to reach any very satisfactory conclusion in regard to your specimen of *Olearia* species. The only specimen of *O. tenuifolia* Benth. in our herbarium is a small fragment collected by Fraser. So far as can be judged from such a small piece, this somewhat resembles yours, but differs in bearing glandular papillae, as described by Bentham, while yours appears to be smooth and glabrous. Your specimen also somewhat resembles our material of *O. adenophora* F. Muell. but this speices too is distinctly glandular-pubescent. I have not been able to find any sheets from New South Wales agreeing exactly with yours from the Warrego District."

Family EPACRIDACEAE.

Leucopogon pedicellatus sp. nov.

Frutex erectus, 0·5–1 m. altus, caulibus rigidis in parte superiore ramosis, ramulis dense foliatis junioribus tomentosis. Folia erecta, lineari-lanceolata, apice subacuta valde mucronata sed vix pungentia, basi subobtusa breviter petiolata, convexa vel raro plana, supra viridia nitida enervia, subtus glauca striato-nervosa; lamina 1.5–2.5 cm. longa, 2–3 mm. lata; petiolus 1 mm. longus. Flores albi suaveolentes in racemos 5–10–flores in axillis superioribus dispositi, rhaci dense tomentosa, bracteis scariosis suborbicularibus ciliolatis 1.5 mm. diam., bracteolis bracteis similibus sed angustioribus, pedicellis tomentosis 2 mm. longis. Sepala bracteolis similia, late ovata, 2 mm. longa, 1.5 mm. lata. Corolla 4 mm. longa, anguste campanulata, lobis anguste lanceolatis tubo paulo brevioribus. Stamina prope faucem affixa, antheris oblongis apicibus sterilibus nullis. Ovarium glabrum, 6–9–loculare, disco hypogyno 0.5 mm. alto 5–lobato, stylo robusto 1 mm. alto. Drupa depresso-globosa 6 mm. diam.

NEW SOUTH WALES.—Byron Bay, very common on sandy land, *C. T. White* 10434 (flowers), 24-8-1936 (shrub 2 ft., flowers white, sweetly scented). Distributed as *L. Richei* R. Br.

QUEENSLAND.—Moreton District: Tugun, 66 miles S.E. of Brisbane, in "wallum" country (*Banksia aemula* and low shrubs), grey, sandy acid soil (white sand + humus), *C. E. Hubbard* 3865 (flowers), Sept. 1930 (distributed from Herb. Kew as *Leucopogon* sp.); Tugun, common in sandy land edge of large peat swamp, *C. T. White* 7107 (flowers), Sept. 1930 (upright shrub, 0.5–1 m. high, flowers white, pleasantly scented); Chermside, near Brisbane, on rocky (quartz) hillslopes, in open Eucalyptus forest, common and scattered through the forest, *C. E. Hubbard* 4047 (flowers), Sept. 1930 (distributed from Herb. Kew, Eng., as *L. muticus* R. Br.) ; Chermside, near Brisbane, common on rocky hills, *C. T. White* 6137, Aug. 1928 (upright shrub about 1 m. high, very handsome and floriferous, leaves light green above, glaucescent beneath, flowers white) ; Chermside, near Brisbane, common on rocky hills, *C. T. White* 6206 (type: flowers and young fruits), Sept. 1928 (erect shrub, stems branched towards the top, flowers white, young fruits 9–celled) ; Caloundra, *Dr. F. H. Kenny* (flowers), Aug. 1906. Wide Bay District: Noosa, *H. A. Longman* (fruits), Oct. 1912; Tin Can Bay, moderately common on "wallum" flats, *C. T. White* 12248 (flowers), Sept. 1943 (much-branched shrub, under 1 m., many stems from a common stock, flowers white) ; mainland opposite Fraser Island, common in sandy soil —"wallum" country, *S. F. Kajewski* 10 (sterile), Jan. 1928; Fraser Island, *C. T. White* (flowers and young fruits), Oct. 1921 (detd. and distributed from Herb. Brisb. as *L. Richei* R. Br.

In the past this has been mostly confused with *L. Richei* R. Br. which differs in having oblanceolate leaves, sessile flowers, the anthers with sterile tips and the ovary 5–celled. It has also been determined as *L. muticus* R. Br. which differs in the leaves being paler, hardly glacous beneath, spikes short and at most 5–flowered, flowers sessile and ovary 5–celled. The present species is undoubtedly nearest to *L. pleiospermus* F. Muell. which differs, however, in concave not convex leaves, green not glaucous beneath, and pedicels shorter (not exceeding the bracteoles). The geographical range of both species is distinct, *L. pleiospermus* F. Muell. is an inland, *L. pedicellatus* C. T. White a costal plant.

Leucopogon recurvisepalus sp. nov.

Frutex 1.5 m. altus rigidus et anguste erectus vel plus vel minus vagans, ramulis pubescentibus vel paene hirsutis. Folia linearia 0.6–1 cm. longa, utrinque tenuiter pubescentia deinde glabra, sessilia vel subsessilia, supra viridia enervosa, subtus pallidiora, paralleli-nervosa cum 5–7 nervis prominulis, apicem in acumen validum pungentem longum gradatim angustata, acumine ipso ca. 1 mm. longo. Flores singuli cum vel sine rudimento, rarissime in spicas 2–3–floras dispositi; bracteis anguste ovatis acutis 0.75 mm. longis, bracteolis late ovatis vel fere orbiculatis ciliatis apice abrupte longe mucronatis, sine mucrone 1.5 mm. longis 1 mm. latis, mucrone ipso 1 mm. longo. Sepala lineari-lanceolata 4 mm. longa, margine ciliata, apice in acumen longum gradatim angustata mox recurva. Corolla 5 mm. longa, lobis tubo longioribus. Antherae lineares, 1 mm. longae, apicibus sterilibus nullis. Ovarium 5–loculare; discus hypogynus cupuliformis, prominenter 5–dentatus. Fructus costatus ellipsoideus cum basi brevi sterili 3 mm. longus.

Moreton District: Hills near Plunkett, S. of Brisbane, sandstone ridge, open Eucalyptus forest, *C. E. Hubbard* 3798 (type: flowers), 31-8-1930 (distributed from Herb. Kew as *L. ericoides* R. Br.) ; Plunkett, *C. T. White* sine No. (flowers and fruits), Aug. 1923 (determined and distributed by Herb. Brisbane as *L. ericoides* R. Br.) ; Plunkett, fairly common on sandstone ridges, *C. T. White* 5584 (flowers), 24-2-1929 (shrub 4 ft., of narrow, upright or rather straggling growth).

The present plant is very close to *L. ericoides* R. Br. though it can easily be detected at sight. The two species key out as follows:—

Branchlets glabrous or minutely pubescent, bracteoles with a short blunt point, minutely denticulate-ciliolate, sepals straight scarcely 3 mm. long, bluntly acuminate, almost obtuse, margins minutely denticulate-ciliolate; corolla 4 mm. long .. .. *L. ericoides.*

Branchlets pubescent, almost hirsute; bracteoles with a long sharp point of about 1 mm., prominently ciliate; sepals 4 mm. long, gradually and lengthily acute, soon recurved, margins ciliate; corolla 5 mm. long .. .. *L. recurvisepala.*

Leucopogon rupicolus sp. nov.

Frutex densus, 1.5 m. altus, ramulis rigidis albo-villosis. Folia conferta, erecta vel deinde patentia margine valde plerumque ad costam mediam revoluta utrinque breviter et plus vel minus dense pubescentia, supra viridia subtus glaucescentia, breviter petiolata, lineari-lanceolata, apice acumine pungente 1–2 mm. longo terminata, lamina cum acumine 1–1.4 cm. longa, petiolo vix 1 mm. longo. Flores axillares, solitarii, subsessiles, bracteis minutis, bracteolis subrotundis 1 mm. diam. ciliolatis. Sepala ovato-lanceolata, 3 mm. longa. Corolla 7 mm. longa, tubo 4.5 mm. longo, faucem versus ampliato, lobis angustis 2.5 mm. longis. Antherae obtusae, lineares, 1 mm. longae, apicibus sterilibus nullis. Discus hypogynus cupularis, 5–dentatus. Ovarium 1–2–loculare in parte superiore pilis albis plus vel minus sparsis vestitum. Fructus 6 mm. longus, ellipsoideus, leviter et irregulariter striato-costatus.

Moreton District: Glasshouse Mts., alt. 1,760 ft., on summit of mountain, *D. A. Goy* 63 (flowers and young fruits), Oct. 1935 (small bushy subshrub, flowers white). Burnett District: Biggenden Bluff, alt. 2,000 ft., in rocky places, hillslopes, *C. T. White* 7723 (type: flowers and fruits), Aug. 1931 (shrub 1.5 m. of rather dense growth, flowers white).

The present species is very close to *L. margarodes* R. Br. but the two can be distinguished as follows:—

Small tree 2-3 m. in sandy land, leaves glabrous or hairy, 0.7-1 cm. long, acumen very short, rather blunt; flowers in 3-fld. spikes, sometimes reduced to 1 flower and rudiment, corolla 4 mm. long, shorter than the calyx, fruit prominently striate with a sterile base .. .. *L. margarodes.*

Shrub 1-1.5 m. in rocky places, leaves hairy on both sides, 1-1.4 cm. long, acumen 1-2 mm. long, strong and very pungent; flowers solitary, corolla 7 mm. long, tube considerably longer than the calyx, fruit slightly striate without a sterile base .. .. *L. rupicolus.*

Family SOLANACEAE.

Solanum discolor *R. Br.* var. **procumbens** *var. nov.*

Planta procumbens, foliis ellipticis vel ovatis.

Darling Downs District: Upper Teviot, *Rev. B. Scortechini* (type: Herb. Melb.). Moreton District: Canungra, in rain-forest, *C. T. White,* May 1917. Wide Bay District: Kin Kin, *C. T. White,* Jan. 1917.

In the National Herbarium, Melbourne, Scortechini's plant bears a label honouring his name by Mueller. The field label in Scortechini's handwriting is as follows: "Solanum discolor ? R. Br., Upper Teviot. It trails closely to the ground, forming large patches, the calyx is deeply lobed, the berry is red, characters removing it from *S. discolor.*"

In Bentham's "Flora Australiensis" iv. 456 and in Bailey's "Queensland Flora" iv. 1082 the berry of *S. discolor* R. Br. is described as greenish white. It is a very common shrub, however, in Queensland and the berry so far as I have observed is always a bright red when ripe. The type comes from the Coen River, Cape York Peninsula, so it is more than likely when examined the southern plant may be found distinct.

Solanum stelligerum *J.E. Sm.* var. **procumbens** *var. nov.*

Planta decumbens, caulibus radicantibus, ramis ascendentibus 20–30 cm. alt., foliis late ovatis, ellipticis vel fere oblongis.

Moreton District: Lamington National Park, alt. ca. 1,000 m., in rain-forest, *C. T. White* 11889 (type: flowers), 27-11-1942 (prostrate Solanum, creeping stems rooting freely and here and there sending up shoots 20–30 cm. high, flowers lilac); Numinbah, *C. T. White* 10232 (flowers), 10-4-1935 (procumbent Solanum common on floor of rain-forest, rooting here and there at the nodes); Currumbin, *C. T. White sine No.* (flowers), Sept. 1912 (quite prostrate, almost carpet-like, occasionally half-climbing), head of Little Nerang River, *C. T. White sine No.* (flowers), Jan. 1916 (a Solanum creeping near the ground).

Apart from its prostrate habit the present variety can generally be told at sight from the normal form by its broad short leaves. After considerable time spent on an examination of all our material, however, I consider it only worthy of varietal rank, especially as a prostrate variety also occurs of the closely allied *S. discolor* R. Br.

Family Scrophulariaceae.

Angelonia salicariaefolia *Humboldt & Bonpland* Plantae aequinoctiales Vol. 2, p. 92, t. 108.

Cook District: Innisfail, subspontaneous about the town, *C. T. White* 11735 (flowers), 7-12-1941 (perennial herb, flowers bluish purple in the centre, white towards the edges); Horn Island, Torres Straits, on site of old garden, *H. J. Tyack Bake* (flowers), June 1943.

This plant, a native of Venezuela, is very common in cultivation in North Queensland and is subspontaneous around many towns. There is considerable colour range in the flowers from white to dark purplish blue.

Family Acanthaceae.

Xerothamnella *gen. nov.*

Calyx in sepalos 5 profunde divisus, sepalis angustis. Corolla bilabiata. Corollae tubus limbo brevior, rectus; limbus 2–labiatus, labio superiore 4–lobato, labio inferiore integro. Stamina 2, filamentis applanatis, parte libera brevi prope basin loborum labii superioris affixa; antherarum loculus unus perfectus terminalis, altero ad dentem parvum reducto; pollen ellipsoideum, laeve. Staminodia 0. Discus crassus. Capsula applanata, ellipsoidea basi in stipitem solidum angustata. Semina 2 vel abortu 1, plano-compressa, tuberculata. Frutex. Folia integra, parva. Flores solitarii, ad axillas foliorum superiorum confertorum dispositi. Bracteae 0. Species 1, Australiana.

X. parvifolia *sp. nov.*

Frutex parvus, vagans, ramosissimus, ramulis pilis appressis dense obsitis. Folia sessilia, elliptica, crassa, tenuiter pubescentia vel deinde glabra, 6–8 mm. longa, 2.5–3 mm. lata, costa media subtus elevata, nervis lateralibus non visibilibus. Flores singuli, ad axillas foliorum confertorum plerumque ad apicem ramulorum brevium lateralium dispositi. Bracteae 0. Sepala angusta, acuta, 5 mm. longa, 0·75 mm. lata, pubescentia. Corolla bilabiata, labio superiore 4–lobato, 7 mm. longo (parte integra 4 mm., lobis 3 mm.), lobis albis basi rubro-punctatis, labio inferiore integro 6 mm. longo extus albo intus atro-sanguineo, tubo labiis breviore, 3 mm. longo. Stamina 2, filamentis applanatis, parte libera brevi prope basin loborum labii superioris affixa; antherarum loculus unus perfectus terminalis, altero ad dentem parvum reducto; pollen ellipsoideum laeve. Staminodia 0. Discus crassus. Ovarium glabrum, stylo pubescenti gracili. Capsula plano-compressa, ellipsoidea, basi in stipitem solidum angustata, cum stipite 1 cm. longa, 3 mm. lata, 2–sperma vel abortu 1–sperma; semina plana, tuberculata, vix 3 mm. lata.

Warrego District: Dynevor Downs, rather rare on dry hard stony hillsides, *C. T. White* 12052 (type: flowers and capsules), 1-4-1941 (small straggling intricately branched shrub 1 m. or slightly more high; upper lip of corolla 4–lobed, lobes white with a few red spots at the base; lower lobe entire, deep blood red inside; white outside); Wittenburra Station, about 36 m. south of Eulo, growing on hillsides, *S. L. Everist* & *L. S. Smith* 48 (flowers), 7-1-1937 (small shrubby, woody).

In Lindau's account of the family Acanthaceae in Engler & Prantl's Pflanzenfamilien (Vol. IV, pt. 36) *Xerothamnella* would come into the section IV. B.13 *Acanthoideae—Imbricatae—Pseuderanthemeae* with affinities to *Pseuderanthemum* Radlk. which differs in possessing a long slender corolla tube with a spreading almost equally 5–lobed limb. The most characteristic feature of the new genus is the 2–lipped corolla limb, the upper segment 4–lobed, the lower entire. In the field the difference in colour of the two lips is most striking.

Family Myoporaceae.

Eremophila tetraptera sp. nov. (Pl. III).

Frutex glaber, ramulis robustis, partibus novellis viscidulis. Folia lineari-lanceolata, 4–5·5 cm. longa, 4–7 mm. lata, in sicco rugulosa, in vivo probabiliter carnosula, nervis et venis invisibilibus, apice subobtusa, basi in petiolum brevem gradatim attenuata. Flores atro-rubri singuli in axillis foliorum superiorum; pedunculi graciles, apicem versus incrassati et obscure angulati, ca. 1·5 cm. longi. Calyx basin usque fissus, segmenta linearia, in sicco rugulosa, in alabastro basi imbricata, in flore adulto patentia, 5 mm. longa. Corolla basi angusta abrupte ampliata, leviter curvata vel fere recta, 3 cm. longa, bilabiata, sed lobis subaequalibus; os 1·5 cm. diam.; lobi subrotundi, intus brevissime et tenuiter tomentosi. Stamina exserta; filamenta glabra juxta basin tubi inserta, antherarum loculi divergentes. Ovarium glabrum, 4–angulatum, deinde 4–alatum, stylus gracilis, flexuosus, satis longus, post anthesin diu persistens. Fructus siccus, profunde 4–alatus, 1·2 cm. longus, 1 cm. latus.

Gregory North District: Old Cork and between Diamantina Gates and Springvale, *L. G. Walker* (flower-buds and old capsules), Feb. 1942.

The prominently winged Dodonaea-like fruits are very characteristic. The only other *Eremophila* described with winged fruits is *E. pterocarpa* W. V. Fitzg. from West Australia but from the description this seems a totally different plant.

Family Labiatae.

Microcorys queenslandica sp. nov.

Frutex 2 m. altus, erectus, virgatus, ramulis glabris subquadrangulis internodiis plus vel minus profunde 2–sulcatis. Folia opposita glabra, sessilia, anguste linearia, supra concava, apice acuta (vix mucronata), 1.5–2 cm. longa, 1 mm. lata. Pedicelli glabri axillares, 1 mm. longi, prope apicem bracteati; bracteis 0·5–0·75 mm. longis, minute ciliolatis. Calyx nitidus, prominenter 5–dentatus, glaber; tubo 10–costato, 3 mm. longo, dentibus acutis triangularibus vix 1 mm. longis. Corolla extus pubescens, 7 mm. longa, exserta, tubo cylindrico superne in faucem campanulatum dilatato, limbo 2–labiato, postico concavo emarginato antico 3–lobato breviore. Stamina perfecta 2, postica; antheris dimidiatim 1–locularibus, connectivo elongato antice in appendicem dilatatum barbatumque productum; staminodia 2 antica, staminibus aequilonga, antheris ad connectivum parvum in ramos 2 breves productis. Nuculae reticulatae.

Mitchell District: Enniskillen, common in rocky sandstone hills, *C. T. White* 12403 (flowers), 13th Nov., 1943 (shrub 2 m. twiggy upright growth; flowers white, sometimes with a faint purplish tinge).

The genus was previously thought to be confined to West Australia. It comes into the section *Hemigenioides* and has closest affinity to *M. tenuifolia* Benth. which differs in the branches being hoary or white with minute appressed hairs, the flowers larger and the calyx clother with a minute hoary pubescence.

Prostanthera lepidota sp. nov.

Frutex expansus, ramosus, 2 m. altus, odore gratissimo, ramulis rigidis sparse pilosis plus vel minus dense lepidotis. Folia conferta, utrinque densissime glanduloso-lepidota, anguste obovata, crassiuscula, enervia, apice obtusiuscula, basi in petiolum brevem gradatim angustata, integerrima, plana vel leviter concava vel petiolum versus plus minusve involuta; petioli 1–2 mm. longi; laminae 0.8–1.4 cm. longae, 3–4 mm. latae. Flores singuli in axillis foliorum superiorum ramorum brevium lateralium; pedicellus 2–3 mm. longus, albo-villosus et papillosus, prope basin bracteis 2 minutis praeditus. Calyx papilloso-glandulosus, 8 mm. longus, bilabiatus, tubo basin versus leviter costato, labiis obtusis fere aequilongis. Corolla 2·5 cm. longa, pilis albis plus vel minus sparsis obsita, labio postico concavo antico multo breviore. Stamina 4; antherae 2–loculares, loculis leviter divergentibus, connectivo parvo in appendiculam non productivo. Nuculae (immaturae) rugulosae.

Mitchell District: Enniskillen, common in rocky sandstone hills, *C. T. White* 12404 (flowers), 13th Nov., 1943 (shrub 2 m., spreading branching habit, flowers at first greenish yellow or cream, later a peculiar bluish green (olivaceous or almost cupreous) with a tinge of purple).

In Bentham's arrangement in the "Flora Australiensis" this species comes into Section *Euprostanthera,* Series *Subconcavae,* with closest affinities probably to *P. lithospermoides* F. Muell. which differs in the young shoots being silky, the leaves 2–5 cm. long, calyx smaller 5 mm. long and anthers with one appendage about twice as long as the cell.

Family Amaranthaceae.

Ptilotus leucocoma (*Moq.*) *F. Muell.* Census Aus. Plants (First Edition) 29 (1882).

Warrego District: Near Adavale (only one plant seen), *Dr. MacGillivray* (ex herb. A. Morris No. 944); Cunnamulla, *C. B. Christesen* (flowers), Sept. 1932; Charleville, E. W. Bick (flowers), Dec. 1916; Wallal, common on sand plains, *C. T. White* 12026 (flowers), 26-3-1941 (annual; flowers lavender).

Several of the above specimens had been distributed previously as *Trichinium calostachyum* F. Muell. but the scale-like teeth between the stamens characteristic of that species are missing in the specimens quoted above. The type gathering is not available to me and the description in the "Flora Australiensis" v. 238 "dorsal hairs not so dense nor so long as in most species" I hardly think applies. Our specimens agree, however, with material from north-west New South Wales distributed by the National Herbarium, Sydney. According to J. M. Black, "Flora of South Australia," 213, the species occurs in New South Wales but has not been collected in South Australia since the original gathering was made in that State.

Family CHENOPODIACEAE.

Bassia bicornis (*Lindl.*) *F. Muell.* var. **horrida** *n. comb.*

Sclerolaena bicornis Lindl. var. *horrida* Domin Bibl. Bot. Heft. 89, Teil 1, 69 (623) (1921).

Sclerolaena horrida Domin, l.c. (in obs.).

This plant is very common in Western Queensland, where along with the normal form it is popularly known as Goat Head. It is one of the most objectionable burr plants of the interior. Domin has suggested it might be worthy of specific rank and this was my impression for some time, but on close examination I cannot find any substantial differences other than the size of the fruiting perianth and the length of the spines. In the normal form the fruiting perianth averages 1 cm. across and the spines 1 inch long; in var. *horrida* the fruiting perianth averages 5 mm. across and the spines 5 mm. long.

The variety is represented in the Queensland Herbarium by the following specimens:—

Maranoa District: St. George, *T. W. Gillham*; Noondoo Station, via Dirranbandi, *S. L. Everist* 756 (fruits), 14-12-1934 (woody subshrub); Muckadilla, *D. Grieve;* Mungalalla, alt. 1,390 ft., in railway enclosure amongst grass in brown stony soil, *C. E. Hubbard and C. W. Winders* 6077 (fruits), 1-1-1931 (herb with woody rootstock, grey leaves). Warrego District: Near Wyandra, common on claypans, *C. T. White* 11701 (fruits), 26-3-1941. Mitchell District: Northampton Downs, east of Blackall, *S. L. Everist* 1308 (fruits), 27-8-1935 (intricately branched subshrub on light soil, leaves light green or glaucous cottony); Malvern Hills, 22 miles west of Blackall, *S. L. Everist* 2139 (fruits), 28-6-1940 (subshrub, common on brown clay soils, particularly in areas devoid of grass); Longreach (very prevalent in the district), *T. J. Costello* (fruits), 12-7-1934; Longreach, downs country on more or less stony light, yellowish brown clay loam, *S. T. Blake* 6600 (fruits), 3-7-1934 (tufted, rather bushy, 1–1½ ft. high, glaucous); Arrilalah, *S. T. Blake* 6642 (fruits), 4-7-1934 (more or less bushy light dull green annual); Isisford *S. T. Blake* 6665 (fruits), 6-7-1934 (tufted, stems suberect, leaves more or less glaucous). Leichhardt District: Clermont, *F. J. Graham* (fruits), 17-12-1934.

Bassia decurrens J. M. Black, Trans. Roy. Soc. S. Aust. xlvi. 567 (1922).

Warrego District: Dynevor Downs, *C. T. White* 11703, 2-4-1941. Gregory South District: Nockatunga Station, approx. 27 deg. 40 min. S. 143 deg. E., on claypans, *S. T. Blake* 11811, 26-6-1936 (somewhat spreading, green, about 6 in. high); Nockatunga Station, approx. 27 deg. 40

min. S. 142 deg. 50 min. E., between channels of Wilson River, on loamy sand "claypans," among other chenopods, ca. 300 ft., 27-6-1936, *S. T. Blake* 11838 (tufted, nearly prostrate green undershrub) and *S. T. Blake* 11835 (straggling undershrub, the stems ascending to 9 in., the leaves dull light green—specimens less mature than 11838); on Tanbar, S.W. of Canterbury, on silt beds, *S. T. Blake* 12138, 15-7-1936 (tufted bushy dull green annual of ca. 6 in.); Birdsville, in drift sand between sandhills, *S. T. Blake* 12250, 19-7-1936 (bushy somewhat spreading subglaucous annual of ca. 6 in.).

Not previously recorded for Queensland.

Bassia ramulosa *sp. nov.*

Suffrutex ramosissimus, ramis hirsutis costatis deinde sublignosis. Folia lineari-lanceolata, pilis longis plus vel minus dense obsita, in sicco leviter longitudinaliter rugulosa, 5–6 mm. longa. Flores solitarii. Perianthium fructiferum persistens, subglobosum, depressum, hirsutum, 2.5 mm. diam., spinis 4 vel raro 5, quarum una brevis et bifida, horizontaliter patentibus rectis 2–3 mm. longis. Utriculus oblique verticalis.

South Kennedy District: Banchory, 42 miles W. of Clermont, *Bassingthwaite and Cole* 6 (fruits in various stages), Oct.-Nov., 1935.

In Anderson's key (Proc. Linn. Soc. N.S.W. xlviii. 231-235) the present species would be placed nearest to *B. Drummondii* (Benth.) F. Muell. The distinctions are as follows:—

Fruiting perianth with 3-4 spines, 2 of which are more or less equal, the others smaller .. .. *B. Drummondii* (Benth.) F. Muell.

Fruiting perianth with 4 or 5 spines, one of which is shorter and bifid .. .. *B. ramulosa* C. T. White.

Bassia tetracuspis sp. nov. (Sect. *Anisacantha*).

Suffrutex glaber, caule decumbens, ramis adscendentibus sublignosis valde costatis. Folia linearia, crassiuscula 0.7–1 cm. longa, in sicco ca. 1 mm. lata. Flores solitarii. Perianthium fructiferum persistens, depresso-oblongum, 1–2 mm. diam.; spinis 4, subaequalibus 3–8 mm. longis rectis divergentibus. Utriculus horizontalis vel leviter obliquus.

Darling Downs District: The Oaks, 20 miles S.W. of Tara, common on grey clay soil, following ring-barking of Brigalow (*Acacia harpophylla*), *S. L. Everist* 1738 (type: fruits), 13-3-1939 (intricately branched subshrub, relished by sheep, local name "Bindy-eye"); Hannaford, common in cleared Brigalow (*Acacia harpophylla*) country, *C. T. White* 11305 (fruits), 8-2-1938 (generally regarded by local graziers as a useful fodder for sheep; local names "Tara Lucerne," "Prickly Saltbush," and "Bindy-eye"). Wyaga, near Goondiwindi, *C. T. White*, Sept. 1919; Surat, *T. S. Leonard*, 24-2-1927; Kindon, about 54 miles N.N.E. of Goondiwindi, common where there has been heavy stocking around troughs, *L. S. Smith* 599 (fruits), 7-12-1938; Chinchilla, *J. Mann*, 12-2-1922; Palardo, on land which has been cleared of prickly-pear (*Opuntia inermis*) by *Cactoblastis* (Comm. Director of Agriculture), 26-2-1930; Palardo, alt. 1,100 ft., Brigalow-Beelah country, very common, *S. T. Blake* 5863 (fruits), 9-5-1934 (tufted, more or less prostrate, green; local name "Bindie"). Maranoa District: Mount Abundance, *Story* (local name—Dog Burr). Port Curtis District: Gogango, *Cole*. Warrego District: Morven, alt. 1,400 ft., Acacia forest on dull brown silty clay, *S. T. Blake* 5674 (fruits), 1-5-1934 (tufted, decumbent, scarcely glaucous). Leichhardt District: Wandoan, in Brigalow country on heavy clay soil, *C. E. Hubbard* 5041 (fruits), 17-18-11-1930 (plants spreading over the ground, with glaucous-green leaves. Distributed ex Herb. Kew as *Bassia divaricata* (R. Br.) F. Muell.).

A very distinctive species so far as observed confined to cleared Brigalow (*Acacia harpophylla*) scrub country where it is very common. It is distinguished from its near allies by its decumbent habit and constantly four nearly equal spines of the fruiting perianth. Its closest affinities lie with *B. tricuspis* (F. Muell.) Anders. and it seems more distinct from that species than does *B. longicuspis* F. Muell. Both these are common in Queensland but most of our material of the latter is scarcely typical and is hardly separable from *B. tricuspis* (F. Muell.) Anders. Anderson in his monograph has remarked on this point when referring to a Queensland specimen. In Anderson's key the new species proposed could be placed as follows:—

Fruiting perianth attached by a broad distended base. Spines 3, more or less equal. Limb erect	*B. tricuspis* (F. Muell.) Anders.
Base of fruiting perianth not distended. Spines 4, more or less equal. Limb erect	*B. tetracuspis* C. T. White.

Bassia *All.* Sectio **Trachycarpus** *sect. nov.*

Perianthium fructiferum biloculatum, loculo superiore minore, semine impleto, loculo inferiore vacuo; tubus irregulariter 10–costatus, costis 5 in spinas compresso-angulatas productis, costis alternantibus minoribus in dentes minutos productis.

Bassia Walkeri sp. nov. (Pl. IV).

Suffrutex, ramis tomento lanoso dense obtectis, deinde glabrescentibus. Folia linearia, crassiuscula, in juventute pilis longis albis sparsis obsita, 5–6 mm. longa, in sicco ca. 0.75 mm. lata. Flores solitarii; perianthium floriferum subdisciforme, lanuginosum. Perianthium fructiferum depresso-globosum coriaceum, 2.5 mm. diam., biloculatum, loculo superiore minore utriculo impleto, loculo inferiore vacuo; tubus 10–angulatus, angulis vel costis alternantibus minoribus, costis majoribus in processus (vel spinas) compresso-angulatos, plerumque furcatos, ca. 1 mm. altos productis. Utriculus horizontalis.

Gregory North District: Diamantina-Mackunda Creek Channels, on flats associated with Soda Bush (*Threlkeldia proceriflora*), *L. G. Walker* (flowers), July 1941 (fruits; type), Feb. 1942.

I have failed to place this in any of the sections of *Bassia* proposed by Anderson in his key to Australian members of the genus *Bassia* (Proc. Linn. Soc. N.S.W. Vol. xlviii., pp. 321-325). The position of the new section in Anderson's arrangement is as follows:—

3A. Flower clusters solitary, the fruiting perianths not connate.

5. Spines broadly flattened, forming horizontal appendages	Section V. *Platyacantha.*
5a. Spines not flattened, acicular	Section III. *Anisacantha.*
5b. Spines compressed-angular, erect, mostly furcate or lobed at the top	Section IIIA. *Trachycarpus.*

In Ulbrich's account of the Chenopodiaceae (Pflanzenf. ed. II 16c. 1934) I should say *B. Walkeri* would come under his genus *Austrobassia* (Sect. *Ventricosae*).

In the horizontal utricle and seed, large cavernous base of the fruiting perianth and irregular upright spines, *Bassia Walkeri* seems to come closest to *B. anisacanthoides* (F. Muell) Anders. but it is very distinct from that species. Ulbrich l.c. follows Domin in retaining this latter species under *Coilocarpus* F. Muell. ex Domin but does not recognise that Anderson, after an examination of the types, united *Bassia brevicuspis* F. Muell. with *Echinopsila anisacanthoides* F. Muell. The full synonymy of this species is therefore as follows:—

Bassia anisacanthoides *R. H. Anderson* Proc. Linn. Soc. N.S.W. xlviii. 330 (1923).

Echinopsila anisacanthoides F. Muell. Trans. Phil. Instit. Vic. ii. 76 (1858) (oldest name).

Sclerolaena anisacanthoides Domin Bibl. Bot. Bd. xxi. Heft 89, Teil 1, 624 (1921).

Anisacantha brevicuspis F. Muell. Fragm. iv. 150 (1864).

Kentropsis brevicuspis F. Muell. l.c.

Threlkeldia brevicuspis F. Muell. ex Benth. F. Austr. v. 198 (1870).

Bassia brevicuspis F. Muell. First Census 30 (1882), and Icon. Austr. Salsol. Pl. Plate lxvii. (1889).

Coilocarpus brevicuspis Domin Bibl. Bot. Bd. xxi., Heft 89, Teil 1, 625 (1921).

Distribution.—Queensland and New South Wales. Very widely spread and common especially in the former State where it is popularly known along with *B. echinopsila* F. Muell. as Red Burr.

Family MONIMIACEAE.

Steganthera australiana sp. nov.

Arbor parva, ramulis subteretibus glabris. Folia opposita, petiolata; petiolus ca. 5 mm. longus; lamina glabra, lanceolata 9–12 cm. longa, 2.5–4 cm. lata, apice gradatim acuminata, basi cuneata, chartacea, integra vel in parte superiore distanter dentata vel margine in sicco undulata et semi-dentata, nervis venisque supra parum conspicuis, subtus subprominentibus, venis laxe reticulatis, nervis praecipuis 6–8 in utroque latere in venam intramarginalem prominulam 3–5 mm. a margine confluentibus. Flores masculi in cymas paucifloras (semper 3–floras in speciminibus nostris) laterales dispositi, pedunculis pedicellisque pilis brunneis longis obsitis, pedunculo ca. 1 cm. longo, pedicellis 1.5–2 mm. longis; flores (alabastri ?) depresse globosi, 3 mm. diam., pubescentes. Stamina 4, filamentis applanatis, dense hirsutis, antheris 0.5 mm. latis. Flores foeminei et fructi ignoti.

Cook District: Garradunga, common in rain-forest, *C. T. White* 11738 (flowers), 5-12-1941 (small tree, flowers cream).

The genus previously contained seventeen described species all but one of which, in the Celebes, were found in New Guinea. Among previously described species the Australian plant seems to come closest to *S. Schlechteri* Perk. and the two can be distinguished as follows:—

Leaves oblong or ovate-oblong, 9-13 cm. long, 3.75-5.75 cm. broad, toothed in upper part .. .. *S. Schlechteri.*

Leaves lanceolate, 9-12 cm. long, 2.5-4 cm. broad, entire, undulate or with a few distant teeth in the upper part .. .. .. *S. australiana.*

Family Proteaceae.

Grevillea albiflora sp. nov.

Frutex 2–5 m. altus, ramulis robustis subrigidis dense sericeis. Folia 12–18 cm. longa, profunde pinnatifida, segmentis 5–7 angustissime linearibus, infimis saepe bilobis, 8–12 cm. longis, 1.5 mm. latis, apice leviter pungentibus, utrinque sericeis supra deinde glabris, subtus 2–sulcatis. Racemi in paniculos terminales dispositi, 10–14 cm. longi, ramis et pedicellis lanuginosis, pedicellis robustis 5–6 mm. longis. Petala extus dense sericea intus glabra, 7 mm. longa. Torus rectus. Ovarium dense sericeum manifeste stipitatum, stipite 1·5 mm. longo, stylo glabro, stigma obliquo. Folliculus extus tomentoso-sericeus, 2 cm. longus, 1.5 cm. latus.

Warrego District: Gilruth Plains, E. of Cunnamulla, on sandridge with *Callitris, Triodia,* &c., *S. T. Blake* 14065 (flowers and old capsules), 20-5-1939 (irregular hoary shrub 6–15 ft.; flowers white).

According to the arrangement by Bentham in the "Flora Australiensis" the present species comes in the Section *Eugrevillea* but fits into neither series as outlined by him for the ovary is both densely villous and stipitate. The series *Hebegynae* could be emended to include it when it would come very close to *G. eriostachya* Lindl. but the two species can be distinguished as follows:—

Leaves simply pinnately divided (rarely undivided). Flowers subsessile, ovary sessile. Native of West Australia .. .. *G. eriostachya.*

Leaves pinnately divided, lowest segments often again divided. Flowers on pedicels of 5-6 mm. Ovary distinctly stipitate (stipes 1.5 mm.). Native of South-west Queensland .. .. *G. albiflora.*

Hakea collina sp. nov.

Frutex dense et contorte ramosus, ramulis robustis rigidis juvenilibus dense vel tenuiter appressee hirsutis. Folia teretia pungentia, 2–4 cm. longa, ca. 2 mm. diam. Flores parvi, in fasciculos axillares dispositi. Pedicelli graciles, 4 mm. longi, appresse et plus vel minus tenuiter pubescentes. Petala extus pilis longis albis sericeis adpressis vestita, 5 mm. longa. Torus rectus; glandula magna carnea unilateralis patelliformis. Ovarium glabrum perbreviter stipitatum, stylo elongato, glabro, stigmate obliquo fere plano sed in medio apiculo parvo instructo. Folliculus (in specimine nostro imperfectus) laevis, ca. 2 cm. longus, 7 mm. latus, basi angustatus curvatus.

Warrego District: Dynevor Downs, E. of Thargomindah, on sandstone tableland, in open stunted Acacia scrub, alt. 600-700 ft., *S. T. Blake* 14088 (type: flowers), 22-5-1939 (irregular, gnarled, more or less intricately branched shrub of ca. 3–4 ft.; leaves dull green, perianth whitish, style reddish); near Eromanga, on rugged sandstone hills, alt. about 1,000 ft., *S. T. Blake* 11893 (flowers and old capsules), 1-7-1936 (rather dense, intricate shrub ca. 3 ft. high; leaves dull olive green or dull subglaucous; perianth cream, style red); Quilpie, *A. K. Shield* (flowers), Dec. 1933.

In Bentham's arrangement in the "Flora Australiensis" the present species would come in the Section *Euhakea* series *Pubiflorae* and would come between *H. rugosa* R. Br. and *H. epiglottis* Labill. The present species would key out as follows:—

Fruit rugose, stigmatic disk with a central cone.

Fruit above 1 inch long, ¾ inch broad .. .. *H. rostrata.*

Fruit ½-¾ inch long, under ½ inch broad .. .. .. *H. rugosa.*

Fruit smooth or slightly rugose, stigmatic disk flat or with a minute central apiculum.

Leaves 4-7.5 cm. long, 1 mm. diam. Native of Tasmania .. *H. epiglottis.*

Leaves 2-4 cm. long, 2 mm. diam. Native of South-west Queensland .. .. *H. collina.*

Hakea intermedia *Ewart and Davies* Fl. North. Terr. 86, tab. 10 (1917).

Gregory South District: Mount Howitt Station, about 80 miles W. of Eromanga, in drifted sand at and near the base of sandhills, *S. T. Blake* 11935 (flower buds, a few older flowers and old fruits), 4-7-1936 (irregular small tree up to 20 ft., with very thick dark grey deeply furrowed corky bark; flowers dull yellow, scented); Tanbar Station, S.W. of Canterbury, on sand-plain among *Triodia Basedowii, S. T. Blake* 12142 (flowers), 15-7-1936 (narrow, rather irregular shrub or small tree, up to 15 ft., with dark grey rather rugged bark; leaves dull subglaucous; flowers dirty yellow).

Specimen No. 11935 bears mostly young buds rather badly insect-eaten but they have the oblique gland of *H. intermedia* Ewart and Davies. It consists of two sheets taken from separate trees; a sterile vigorous shoot has leaves up to 20 cm. long. No. 12142 has leaves mostly about 5 cm. long, racemes up to 12 cm. long and large flowers on pedicles up to 1 cm. long, the flowers are badly insect eaten, especially the stigmatic tops of the pistils but one or two in better preservation show the peculiar stigmatic top of *H. intermedia* Ewart and Davies described by the authors.

Helicia Bauerlenii sp. nov.

Arbor parva, 6–10 m. alta, ramulis robustis junioribus dense ferrugineo-pubescentibus. Folia perbreviter petiolata, serrulata, lanceolata, apice acuta, basin versus leviter angustata sed basi ipsa obtusa, utrinque valde reticulata, supra glabra, costa media excepta; costa media impressa plus vel minus dense ferrugineo-floccosa; venis et venulis elevatis; subtus ferrugineo-pubescentia, costa media et nervis praecipuis valde elevatis; petiolo 2–2·3 mm. longo; lamina 12–18 cm. longa, 3–4 cm. lata. Racemi densiflori, 5–8 cm. longi; rhachi pedicellis petalisque densissime ferrugineo-pubescentibus; pedicellis bifloris, 1.5–2 cm. longis. Petala 5 mm. longa; antherae 2 mm. longae. Pistillum 4.5 mm. longum; ovario dense ferrugineo-hirsuto; stylo in parte inferiori pilis paucis longis vestito; stigmate clavato, glabro. Fructus ellipsoideus, 1.3 cm. longus, 1 cm. diam.

New South Wales.—Uralba, *W. Bauerlen* 629 (type: flowering specimens), Nov. 1891 (small tree 20–30 ft. high, 3–6 in. diam.); several sheets in Herbarium Technological Museum, Sydney, labelled *H. ferruginea* F.v.M.?; Chillingham, Upper Tweed River; Mullumbimby, *W. Bauerlen* (flower-buds), Sept. 1895; Murwillumbah, *W. Bauerlen* (flowering specimens), Nov. 1892—all in Herbarium, Technological Museum, Sydney; Chillingham, Upper Tweed River, *J. Dixon*—in Queensland Herbarium, Brisbane.

QUEENSLAND.—Moreton District: Springbrook, only one plant seen as secondary growth, *C. T. White* 6275 (leaves only), 21-9-1929 (shrub 8 ft.); Lamington National Park, *H. Gresty* (flower-buds), Jan. 1941; Lamington National Park, alt. about 3,000 ft., in rain-forest, only a few trees seen, *C. T. White* 11874 (leaves only), 26-11-1942 (tree 30 ft. high, spreading top, conspicuous on account of the large leaves, brown hairy beneath).

This new species is closely allied to *H. ferruginea* F. Muell. and was labelled as such in the herbarium of the Technological Museum, Sydney, and Queensland Herbarium, Brisbane. The two species are closely allied but can readily be told at a glance by a number of small though constant distinctions. In geographical range they are nearly 1,000 miles apart. They can be distinguished as follows:—

Leaves 7-16 cm. long, 3-6 cm. broad, 2 rarely up to 3½ times longer than broad, mainly drying a dark green, sometimes in parts with a slightly yellowish tinge, scarcely reticulate above, secondary and tertiary veins depressed or very slightly raised on the upper surface. Flower-buds slender, 1 mm. diam. in the upper part. Tropical species .. .. *H. ferruginea.*

Leaves 12-26 cm. long, 3-7.5 cm. broad, 3½-5 times longer than broad, drying a bright yellow, with a faint tinge of green, prominently reticulate above, secondary and tertiary nerves prominently raised. Flower-buds stout, 2 mm. diam. in the upper part. Extra-tropical (temperate or at most subtropical) species .. *H. Bauerlenii.*

Helicia glabrescens sp. nov.

Arbor parva, partibus novellis ferrugineo-pubescentibus, ramulis robustis mox glabris. Folia utrinque glabra vel subtus costa media pilis rufis paucis obsita, late lanceolata, 10–16 cm. longa, 4–7 cm. lata, apice obtuse acuminata, basi in petiolum brevem incrassatum gradatim angustata, margine dentata plerumque plus vel minus undulata raro fere integra, nervis praecipuis ca. 8 in utroque latere, nervis venulisque subtus prominentibus supra in sicco prominulis. Racemi axillares 7–12 cm. longi, rhachi glabra vel pilis ferrugineis tenuiter vel subdense obsita, pedicellis 1.5 mm. longis, unifloris binatim dispositis, tenuiter vel raro subdense ferrugineo-pubescentibus. Perianthium 1–1.2 cm. longum, segmentis glabris. Disci squamae 4 liberae, ovarium aequantes. Ovarium dense hirsutum, stylo glabro, stigmate cylindrico, 2 mm. longo. Fructus ellipsoideus, 1.3 cm. longus, 0.7 cm. diam.

Cook District: Barron River, *E. Cowley* 74B (type: flowers), Sept. 1892 (large shrub); near Cairns, in rain-forest on banks of Pine Creek, *S. T. Blake* 12415 (flowers), 2-8-1936 (tree 30 ft. with a dense crown of rich light green leaves which are paler beneath; buds reddish towards the base, cream in upper part, perianth white inside); Freshwater Creek, near Cairns, *F. M. Bailey;* Mount Spurgeon, in rain-forest, *C. T. White* 10643 (old flowers), Sept. 1936 (small tree. Distributed as *Helicia ferruginea* (a form with glabrous leaves and larger flowers)); Julatten, *T. Carr* (young fruits), Oct. 1936; Malanda, *R. F. Martin* (fruits), 30-1-1923; Atherton Tableland, rain-forest on rich alluvial soil, *R. F. Martin* 26 (tree up to 4 ft. girth, very tough and sound).

The present species is very closely allied to *H. ferruginea* F. Muell. and several of the sheets quoted above were labelled in the Queensland Herbarium as a glabrescent form of that species. It is probably the plant referred to by F. Mueller (Vic. Nat. Vol. 2, p. 75) as a form of *H. ferruginea* with almost sessile leaves and glabrous flowers. Several specimens had been labelled in the Queensland Herbarium as *H. australasica* F. Muell., a native of the Northern Territory. This species is known to me only from the description in the "Flora Australiensis" (Vol. 5, p. 405), which might however fit several species of the genus. From the locality records given it is very unlikely it is identical with *H. glabrescens.*

The differences between *H. ferruginea* F. Muell. and *H. glabrescens* C. T. White can be set out as follows:—

Leaves always prominently toothed, ferrugineous-pubescent underneath on the midrib, secondary and tertiary veins, the hairs sometimes almost disappearing from the two latter but never totally absent from the midrib, base commonly subobtuse, petiole without any prominent pulvinus. Perianth not exceeding 5-6 mm., densely ferrugineous-pubescent .. .. .. *H. ferruginea.*

Leaves toothed or almost entire, quite glabrous on both sides in the adult stage, base cuneate, tapering into a short petiole with a rather prominent pulvinus. Perianth 1-1.2 cm. glabrous .. *H. glabrescens.*

Family THYMELAEACEAE.

Pimelea penicillaris F. Muell. in Melbourne Chemist and Druggist (October, 1883).

P. dioica C. T. White. Proc. Roy. Soc. Queensl. xlvii, 29 (1936).

NEW SOUTH WALES.—Near Gwydir, *T. W. Shepherd*; Thurulgoona, Warrego River, *L. Henry,* Sept. 1884, both in National Herbarium, Melbourne.

QUEENSLAND.—Darling Downs District: Near Goondiwindi, *W. Dixon* (Queensland Herbarium, Brisbane).

I am indebted to Mr. A. W. Jessep, Director and Government Botanist, Melbourne Botanic Gardens and National Herbarium, for part of the type and fragment from another collection of *P. penicillaris* F. Muell. Mueller's plant was described from female, mine from male specimens and I should say represent the one species.

Family EUPHORBIACEAE.

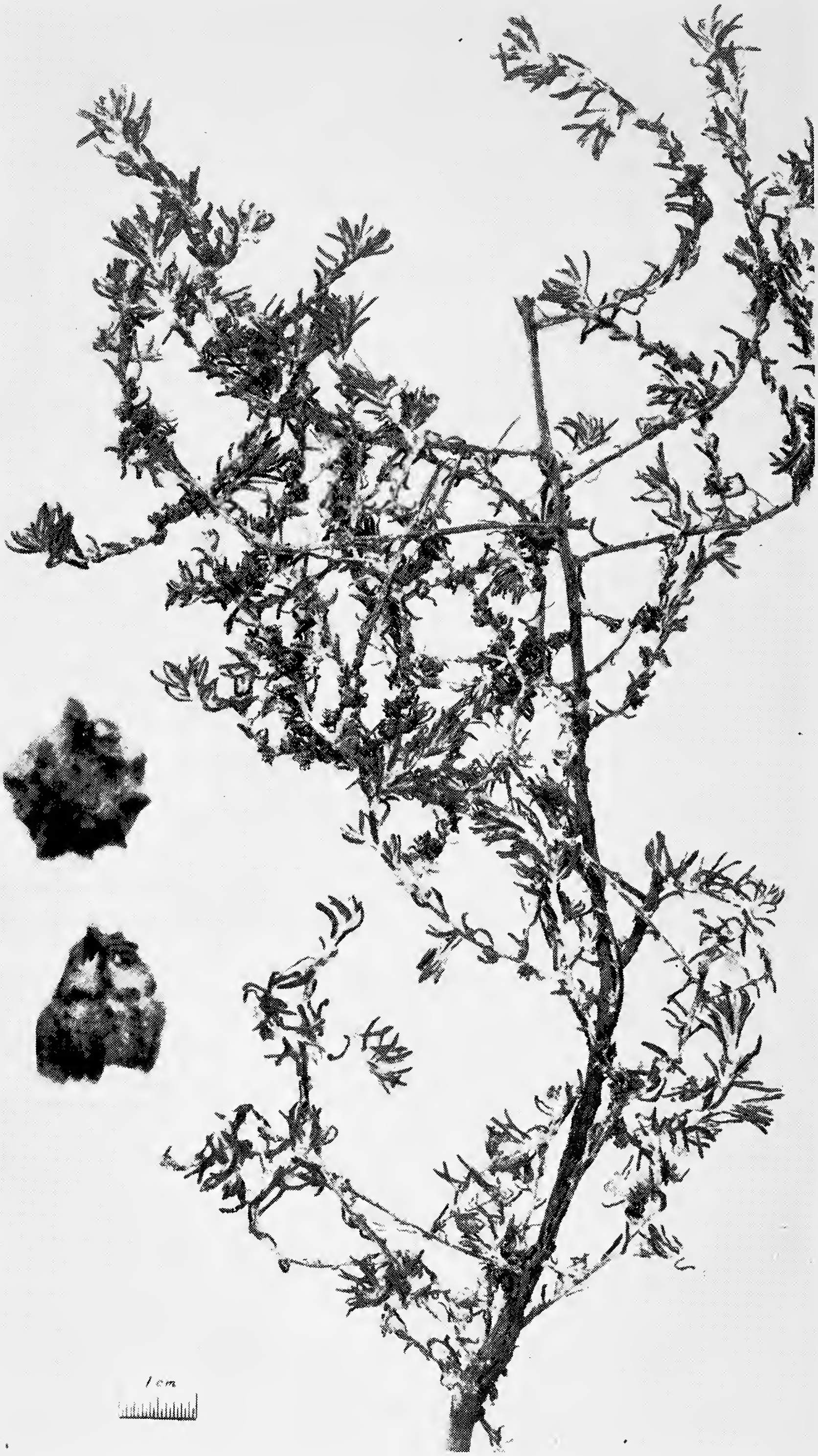
Cleistanthus densiflorus sp. nov. (Sect. *Australes*).

Arbor, ramulis robustis junioribus ferrugineo-pubescentibus adultis glabris cortice griseo, crasso obtectis. Folia lanceolata, utrinque viridia sed subtus pallidiora, glabra, reticulata, apicem versus angustata sed apice ipso subobtusa, basin versus in petiolum crassum brevem angustata; lamina 5–9 cm. longa, 1–2 cm. lata; petiolus 2 mm. longus. Flores in fasciculos densifloros sessiles axillares dispositi; bracteae dense hirsutae. Flos masc.:—Calyx glaber, 3 mm. longus, profunde 5–lobatus. Petala 5, squamiformia spathulata. Stamina 5, columna filamentis longiora. Flos foem.:—Calyx (sub fructu immaturo) 6–lobatus, lobis inaequalibus (3 magnis et 3 parvis alternantibus). Fructus sessilis trilocularis glaber.

Cook District: Bloomfield River, *Rev. W. Poland* (flowers and immature fruits), Nov. 1902.

In the absence of seeds for examination it is not quite certain whether the present species belongs to the section *Australes* Jabl. or section *Nanopetalum* (Hussk). Pax. The latter contains no Australian

Eremophila tetraptera sp. nov. Leafy shoot and detached fruits (all nat. size).



Bassia Walkeri sp. nov. Fruiting branch (nat. size) and fruiting perianths view from above and from the side (× 8).

species. *C. densiflorus* is most closely allied to *C. Dallachyanus* (Baill.) Benth. and the two can be distinguished as follows:—

Leaves ovate, glossy green above, 5-8 cm. long, 2-3.5 cm. wide. Flowers in clusters on more or less leafless branches .. .. *C. Dallachyanus.*

Leaves lanceolate, dull on both surfaces, 5-9 cm. long, 1-2 cm. broad. Flower clusters axillary on leafy twigs .. .. *C. densiflorus.*

Macaranga multiflora sp. nov.

Arbor parva, partibus novellis dense pubescentibus. Folia petiolata, elliptica, elliptico-lanceolata vel ovato-lanceolata, apice acuminata, margine integra sed in sicco plerumque distincte undulata, supra ad basin glandulis 2 impressis praedita, subtus glandulis minutis atro-rubris plus vel minus dense obsita; petiolus 2.5–4 cm. longus; lamina 8–12 cm. longa, 4–6 cm. lata; nervi praecipui ca. 10 in utroque latere, in sicco utrinque distincti; stipulae lanceolatae, pubescentes, 4 mm. longae. Flores in paniculas multifloras dispositi; paniculae 6–10 cm. longae, ramulis tenuibus tomentosis. Flores masculi in fasciculos 8–10-flores dispositi, bracteis sub fasciculis anguste triangularibus vel lanceolatis 2 mm. longis, perianthii segmentis ovatis vix 1 mm. longis. Flores foeminei ignoti. Capsula plerumque bi- vel tri-locularis, loculis subglobosis 4 mm. diam., pericarpio glandulis rubris densissime obtecto, endocarpio crustaceo nitido castaneo, semine rugoso.

Cook District: Johnstone River, *Rev. N. Michael* (type: male flowers), Dec. 1915; Garradunga (common on edge of rain-forest and as secondary growth), *C. T. White* 11750 (fruits), 5-12-1941 (small tree).

Among previously described Australian species the present plant comes closest to *M. subdentata* Benth. and *M. inamoena* F. Muell., both of which differ in having a few-flowered long-pedunculate female inflorescence and echinate capsules.

Euphorbia Lathyrus *L.* Sp. Pl. 457 (1753).

Darling Downs: Toowoomba, naturalised in some of the paddocks near the town, *Helen H. Vellacott* (immature fruits), 12-12-1943.

A native of Southern Europe, not previously recorded as naturalised in Queensland though occasionally seen in gardens.

Euphorbia Sparmannii *Boiss.* Cent. Euph. 5 (1860).

Moreton District: Bribie Island, south end, on sandy flats near the beach, amongst grasses, white sandy soil, *C. E. Hubbard* 2688 (flowers and capsules), 19-5-1930 (prostrate herb, reddish stems); Stradbroke Island, moderately common on the sand dunes, *C. T. White* 6759 (flowers and capsules), 20-4-1930 (herb, stems reddish, leaves apple green above, whitish or reddish beneath)—distributed as *E. atoto* Forst.; Redcliffe, *E. W. Bick* (flowers and capsules), January 1917; Bishop Island, mouth of the Brisbane River, in sand, *S. L. Everist and S. T. Blake* (capsules), 25-7-1932. Wide Bay District: Double Island Point, among rocks overlooking the sea, *D. A. Goy* 98 (capsules), 26-12-1935 (small herb); north of Kelly's Creek, near Bundaberg, fairly common on sand dunes, *L. S. Smith* 444 (capsules), 1-1-1938 (herb with prostrate branches radiating from central root)—distributed as *E. atoto* Forst.

ESSENTIAL OILS OF THE QUEENSLAND FLORA. Part XIX.—The Essential Oil of Halfordia Kendack.

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(*Received 22nd November,* 1943; *tabled before the Royal Society of Queensland, 29th November,* 1943; *issued separately, 26th June,* 1944.)

Halfordia Kendack is a very common tree on the coastal belt in Southern Queensland, particularly on the low sandy areas near the sea between Southport and the New South Wales border. The material for this investigation was collected at Palm Beach.

Leaves and terminal branchlets on steam distillation yielded ·6 per cent. of an oil having the following constants:—

$d_{15\cdot5}$	·8625
n_D^{20}	1·4700
$[\alpha]_D$	+ 38·3
Ester Value	1·3

The oil was shown to be particularly rich in d-α-pinene, this constituent being present to the extent of 90 per cent. The remainder of the oil consisted of cymene (4 per cent.), terpineol acetate, sesquiterpene and sesquiterpene alcohol.

EXPERIMENTAL.

Leaves and terminal branchlets of *Halfordia Kendack* weighing 380 lb. were submitted to steam distillation and gave 1,200 ml. of a clear mobile oil with the above physical constants. The oil was shaken with dilute sodium carbonate and sodium hydroxide solutions in turn, but neither of these solutions extracted anything from the oil. After washing with water and drying, the oil was fractionally distilled through a Young's fractioning column at 4 mm. pressure.

Ninety per cent. of the oil boiled at 35–36° at this pressure. This fraction had the following constants:—

$d_{15\cdot5}$	·862
n_D^{20}	1·4683
$[\alpha]_D$	+ 46·4

These are in good agreement with the physical constants recorded for d-α-pinene. Confirmatory evidence was obtained by oxidation of a sample to pinonic acid identified as its semicarbazone, according to the method set out in Parry's Essential Oils.

The remainder of the oil was fractionated several times to give three head fractions. The first of these had the following constants:—

B.P.	54°C. @ 4 mm.
$d_{15\cdot5}$	·8607
n_D^{20}	1·4880
$[\alpha]_D$	0

This was identified as p–cymene by oxidation to p–toluic acid as follows:—Two mls. of the fractions were refluxed with 20 mls. of dilute HNO_3 (1 HNO_3 : 3 H_2O) for several hours. On standing overnight crystals of p–toluic acid separated out. These were recrystallised from water and melted at 176-177° C. undepressed on admixture with a sample of p–toluic acid.

The next head fraction had—

$d_{15\cdot5}$	·9216
n_D^{20}	1·4812
$[\alpha]_D$	+ 20

This contained an ester as indicated by ester number determinations on the fraction. Two mls. of this were hydrolysed with alcoholic KOH and the presence of acetic acid in the alkaline solution determined by qualitative tests. The impure alcohol was isolated in the usual way and was found to have the characteristic odour of terpineol. This was confirmed by conversion into its acid phthalate, M.P. 116°, by the method used by Kenyon (1).

The last fraction consisted of sesquiterpene and sesquiterpene alcohol giving the characteristic violet colour on treatment with bromine vapour in the presence of acetic acid. Only a few mls. of this fraction were available and it was not further investigated.

Summary.—The essential oil of *Halfordia Kendack* has been shown to consist of d–α–pinene (90 per cent.), cymene (4 per cent.), terpineol acetate, sesquiterpene and sesquiterpene alcohol.

REFERENCE.

(1) Kenyon, J. C. S. (1924), 125, 2304.

NOTES ON THE PETRIE SERIES, SOUTH-EASTERN QUEENSLAND.

(With One Text Figure and One Plate.)

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(*Received* 24*th November,* 1943; *tabled before the Royal Society of Queensland,* 29*th November,* 1943; *issued separately,* 26*th June,* 1944.)

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SUMMARY.

This paper aims at setting out additional information on the Petrie Series. The main facts put forward include an account of faulting, both tension and compression, within the series. The series is shown to be more restricted in area than previously believed, and a Mesozoic age for the strata in the Brighton-Redcliffe-Petrie area is determined. New fossil localities are described, and a comprehensive account of the fossils collected is given. The value of the dicotyledonous leaves, sedges, unionids, and ostracods, as criteria of age, is considered, and, from the palaeontological evidence accumulated, a provisional Miocene age is given to the series. The Strathpine oil shale deposit is described, and shown to be generally low grade, restricted in extent, and economically of limited value. Fresh-water limestone is recorded, and, from the very close resemblance shown on analysis with that from the Silkstone Series, an equivalent age (Miocene) is suggested. The abundance of clays, and their importance as a possible future source of wealth in the area is mentioned.

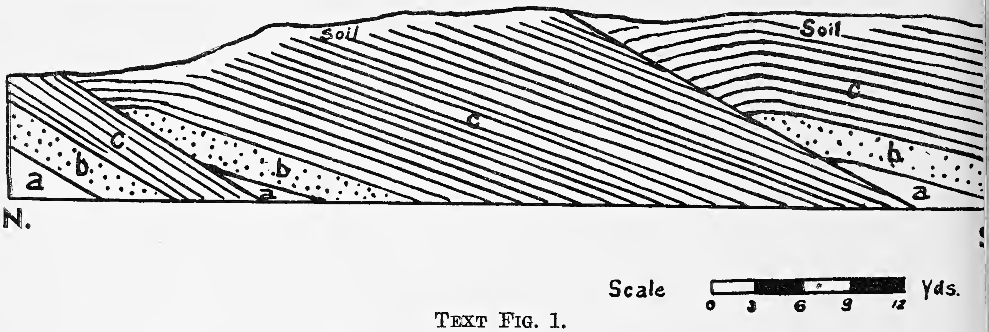
I. INTRODUCTION.

Considering the proximity of the Petrie Series to Brisbane it might appear remarkable to find geological work still left to be done in the area. This, however, has shown itself to be the case. In fact, the only detailed investigation previously conducted in this area has been that carried out by O. A. Jones in 1927. In that year Jones (1927) named and described the Petrie Series in a paper entitled "The Tertiary Deposits of the Moreton District, South-Eastern Queensland," As the following "Notes" are intended to supplement the above paper reference should be made to it for a general account and map of the Petrie Series.

II. EARTH MOVEMENTS AND IGNEOUS ACTIVITY.

Although the Petrie Series may be characterised by gently dipping beds, the outcrops in the southern portion of the series possess often quite high dips. They appear, moreover, in most cases to be associated with what is apparently one persistent reversed fault which has caused both the high dips and the outcrops themselves in an area otherwise almost devoid of exposures.

In 1927 Jones (1927, p. 35) recognised a reversed fault in steeply dipping strata in the road cutting on the Redcliffe road near the corner of Beams road, some two miles south of Bald Hills. This fault which strikes N.N.W. appears to be the continuation of two associated reversed faults that may be seen in the beds which outcrop on the southern bank of the South Pine River, just below Roghan road pumping station. In the latter case, however, the beds are more steeply dipping, and the combined throw of the two faults is much greater than that of the Redcliffe road fault. Both drag and slickensiding are very pronounced especially near the fault plane of the larger fracture which has a throw or vertical displacement of approximately 50 feet and a heave or horizontal displacement of 90 feet. This, combined with the smaller associated fault, which has a throw of some 20 feet and heave of 35 feet, gives a total vertical displacement of approximately 70 feet and horizontal displacement of 125 feet.



TEXT FIG. 1.
N.-S. Section exposed on Bank of South Pine River, showing Reversed Faults.

These faults strike approximately 40 degrees west of north, and continuing in this direction another outcrop, some two miles to the north-west, is encountered. The beds between these two outcrops have been obscured by the accumulation of recent alluvium on the flood plain of the South Pine River. The outcrop to the N.W. is made up chiefly of almost vertical, biscuit-coloured, sandstones and sandy shales on portion 256, parish of Warner, approximately one and a-half miles west of Strathpine railway station. The beds are also very slickensided here, but unfortunately there are no cliffs or cuttings to present a section. It is interesting to recall that according to Bryan (1925, p. 38) "Morton held that these steeply dipping beds were the result of faulting." As there are no exposures to the east or west of this line of outcrop, the angle of dip presumably diminishes fairly rapidly on either side.

The line of outcrop of the beds, which is still 40 degrees west of north and coincident with the strike of the reversed fault, can be traced from portion 256 for half-a-mile through portion 250, parish of Warner, but then disappears, reappearing again about three-quarters of a mile further on in a north-westerly direction on portion 190, parish of Warner. Here the average dip is 45 degrees to the W.S.W., although the outcropping beds at one place are almost vertical. Moreover, the material recently brought up from a shaft put down for oil shale near the outcrop is very much slickensided and suggests heavy faulting. The outcrop of shale can be traced along the strike in a north-westerly direction for several chains. Further exposures may also be found to the N.W. before the Brisbane Schist is finally reached, some one and a-half miles on in that direction.

No outcrops in the Petrie Series could be located in a south-easterly direction from the fault on the Redcliffe road.

From these observations, however, it seems that what is apparently the one reversed fault persists for a distance of at least six miles across the south-western portion of the Petrie Series.

Furthermore, with reference to faulting, it is of interest to note that L. C. Ball (1932, p. 222) has suggested that the Brisbane Schists along the south-western margin of the Petrie Series may mark a faulted contact with the Tertiaries, the latter being either downfaulted on the N.E. or the former being overthrusted from the S.W. As he has stated, the alignment of the schist front here over a distance of 10 miles is strong presumptive evidence for this view. If this is so, it will be seen that it is roughly parallel with the fault which strikes N.N.W. to N.W. across the south-western portion of the Petrie Series and which has been described above.

Some three-quarters of a mile to the south of the Redcliffe road outcrop we have evidence of lateral compression followed by tension. In a quarry on portion 22, parish of Kedron, several chains to the S. of Graham road, can be seen a strong anticlinal fold at the crest of which a block has been let down to give a very spectacular trough fault. The excellent ripple marking of the sandstones in this small quarry also adds to its geological interest. Moreover, the folding and faulting seen in this quarry is probably genetically connected with the occurrence of a mud spring or "volcano" several chains to the E.N.E., in a depression in the south-eastern corner of portion 152, parish of Nundah. This small mud volcano, from which cold mud may be seen slowly pouring forth usually some time after the cessation of rainfall in the area—presumably the result of hydrostatic and not gaseous pressure—has attracted quite considerable interest since its appearance several years ago. It is pertinent to mention here that the Petrie Series is known to be water-bearing in many places, and that the subsoil generally is of a clayey nature.

With reference to the age of these earth movements it can be said that, as palaeontological evidence suggests a probable Miocene age for the Petrie Series (see below), it seems that they are not of pre-Miocene age. It may be recalled that Jones (1927, p. 41) has stated that "The series is overlain at Bald Hills by upper division basalts." As the upper basalts are considered to be of Pliocene age it appears likely that the folding and faulting have resulted from uplift and associated orogeny probably in Middle to Upper Miocene times. This was later followed by the extrusion of the basalt upon the tilted Petrie Series shales as seen in the road and railway cuttings at Bald Hills.

Mention should also be made of the very slickensided decomposed basalt exposed in a quarry on the corner of Barfoot street and Bald Hills road, approximately two miles E.N.E. of Bald Hills, and very close to the eastern boundary of the Petrie Series as shown on Jones' map. The intense weathering which has here preceded the slickensiding is rather puzzling, and hard to explain. However, as there seems little doubt that the basalt is of similar age to that which caps Bald Hills, the slickensiding must be the result of earth movements that post-dated the upper division basalt, and accordingly of late Tertiary age. Moreover, with reference to the weathering, it seems feasible from its very position that the basalt may have been extensively weathered by the action of salt water before the recent uplift. This suggestion seems to receive further support from the presence again of this very slickensided decomposed basalt in the cliff banks of Scott's Point on the Redcliffe Peninsula, several miles to the N.N.E. Another possible explanation, however, is that slickensiding was brought about by slumping of the very weathered basalt or clay following supersaturation.

As opposed to this, the basalt which caps Bald Hills is normally weathered and shows no evidence of slickensiding. In fact, quite fresh specimens can be obtained from the central portion of the weathered spheroids in the road cuttings. This fresh basalt is greenish-black in colour, and has a specific gravity of 2·81. Microscopic examination has shown it to be made up predominantly of titaniferous augite and plagioclase (acid labradorite), together with olivine altering in part to iddingsite, and magnetite.

Apart from the basalt at Bald Hills which has previously been mapped, the writer has noticed weathered basalt outcropping in the road bank along Ridley road between Beams and Roghan road. As this is approximately on the same level as Bald Hills, and is only one mile S. of the most southerly exposure of Bald Hills basalt, it seems likely that this patch of basalt in the Ridley-Roghan road area was formerly connected with it.

III. THE EASTERN AND NORTH-EASTERN STRATIGRAPHICAL RELATIONSHIP OF THE SERIES.

On certain lithological resemblances and the presence of inclusions of shale containing plant markings, it was formerly thought by the writer that the sandstones recently exposed in excavations near the Hornibrook Highway at Brighton, and those outcropping on the southern side of Bald Hills Creek, near the corner of Hall and Lascelles streets, might represent an eastern extension of the Petrie Series towards the coast. Palaeontological evidence has, however, disproved this assumption. A recognisable impression of *Cladophlebis australis* has been discovered in the sandy shales near Bald Hills Creek, and slides made of the fossil wood, which is quite abundant in one sandstone horizon in the excavated cuttings at the Brighton locality, have shown the age to be Upper Triassic. All the fossil wood specimens collected, probably representing seven or eight separate trunks, have proved to be coniferous. They show no sign of water-rounded surfaces, and their relative abundance also tends to confirm their contemporaneity with the sandstone. Radial and transverse sections from two of these specimens have shown them to be identical with *Dadoxylon* (*Araucarioxylon*) *australe* originally described by Crié (1889, p. 5) from beds of Upper Carnic (i.e., Upper Lower Keuper) age at Teremba, New Caledonia. Microscopic study of thin sections made from another specimen has shown it to be *Dadoxylon* (*Araucarioxylon*) *rajmahalense* described by Sahni (1931, p. 69) from the base of the Rajmahal stage (Upper Gondwana) of India. The Rajmahal stage is at the very base of the Jurassic in India. It might be mentioned that Fisher (1931, p. 44) has recorded fossil wood "comparing very closely with *Dadoxylon* (*Araucarioxylon*) *rajmahalense* Sahni" from beds with a typical Upper Esk facies at Aspley, some six miles to the S.W. of the Brighton locality. The Upper Esk Series is generally regarded as being of Lower Keuper age.

Moreover, on closer examination the small patches of shale in the Brighton sandstones were found to be lenticular in shape, and generally parallel with the sandstone bedding. They accordingly represent deposition under quiet conditions in small depressions or hollows in the lake floor. That conditions of deposition were subject to rapid change at this time is also evident, for the sandstones themselves vary considerably in grain size and show very pronounced current bedding. This is strikingly exhibited in the numerous cuttings which have been made to act as slit trenches in these massive sandstones.

The micaceous sandy shales on the southern side of Bald Hills Creek, moreover, have been found to be identical in lithological appearance with those outcropping in the upper portion of the bank outside the Brighton Hotel in which the writer has recently found *Cladophlebis* and *Ginkgo* along with numerous indeterminate plant impressions. The Brighton Hotel sandstone, however, as distinct from the sandy shale, is totally devoid of fossils and is strikingly similar in lithology with the fine-grained red and white micaceous sandstones of the Redcliffe Peninsula. The Redcliffe sandstones, which extend from Clontarf to Scarborough and are overlain in places by basalt, were included in the Petrie Series by Jones (1927, p. 31), although he did not find any fossils in them. As Dunstan in 1915 (p. 3) had originally referred these sandstones to the coastal portion of the Ipswich Series, an intensive search for fossil evidence to confirm their true age was made by the writer. This search revealed a trunk of silicified wood in the sandstones which outcrop on the eastern bank of Humpybong Creek, adjacent to portion 113v, parish of Redcliffe. On examination the wood has shown itself to be coniferous, and determinable as *Dadoxylon sp.* Unfortunately, the preservation is much poorer than that of the material from Brighton, which permitted of specific determination. It might be mentioned, however, that wood of the primitive *Dadoxylon* type is characteristic of the Triassic and earlier periods, preceding in time the diversification of the conifers. Thus, although the wood does not admit of specific determination it is sufficient to place the age of the Redcliffe sandstones as Triassic. It is of interest to note that, although sections of the fossil wood collected from both Brighton and Redcliffe show that they have all been crushed after fossilisation, that from Redcliffe shows the most intense crushing, and suggests the strongest lateral pressure. This crushing can be correlated at Redcliffe with the field occurrence in sandstones which dip at 20° to the S.W. Apart from the fossil wood, the only other organic remains found in the rocks of the Redcliffe Peninsula have been indeterminable plant fragments which show certain resemblances to the stems of some Equisetales. They occur in the weathered sandy mudstones of the cliff bank a few chains to the north of Scotts Point.

The above observations are of some importance, as, combined with the discovery by Bryan (1927a, p. vii.) of shales containing Ipswich fossils on the north bank of the Pine River, almost opposite the confluence of the North and South Pine Rivers, they considerably reduce the area of the Petrie Series as approximately mapped by Jones in 1927. In fact, it now appears that the Petrie Series occupies a roughly circular area of some fifteen square miles centred about Strathpine, and that the material to the north of the Pine River within the parish of Redcliffe is of Mesozoic age. This is also supported lithologically by the presence of massive sandstones, identical with those occurring at Brighton, in portions 21, 434, and 89v, parish of Redcliffe. Bryan, moreover, has recorded (1927b, p. xi.) non-calcareous oolite, similar to that found near the base of the Walloon Series, from the north bank of the Pine River, about three miles from its mouth.

Outcrops of sandstones of Ipswich aspect have also been noted near the Sandgate Cemetery and along Bracken Ridge in portions 97 and 98, parish of Nundah, about one mile east of Bald Hills. This, together with the complete absence of Tertiary exposures to the E. of Bracken Ridge, may mean either that the eastern margin of the series is approximately one mile W. of that shown on Jones' map, or that Bracken Ridge itself is an inlier within the Petrie Series. Unfortunately the low-lying nature of the country and the absence of shaft sinkings in the area to the east of Bracken Ridge still prevents any accurate mapping of the eastern margin of the series.

However, from field observations, it can definitely be stated that the boundary of the Petrie Series in the Bald Hills Creek to Cabbage Tree Creek sector at least is no further to the E. of that approximately determined by Jones and shown on his map (1927, map 2).

With reference to structure it may be mentioned that the Mesozoic sandstones and shales which outcrop E. of the Petrie Series have a general dip to the S.W., and that, following Dunstan (1919, p. 53), the structure may be interpreted as a synclinal trough, the central and western portions of which are unconformably overlain by the Petrie Series in the area under consideration.

IV. PALAEONTOLOGY.

Very few fossils have previously been found in the Petrie Series. In 1925 Morton found a dicotyledonous leaf in almost vertical sandstones about one and a-half miles W. of Strathpine railway station, which proved the series to be of Tertiary age. Subsequently Jones (1927, p. 36) collected two leaves and a probable seed pod from the same outcrop, but, in spite of much search, failed to find any other fossils in the series. In 1932 Ball (1932a, p. 221) observed a few indistinct carbonised plant impressions together with one small mussel-like shell and some small sandy, probably coprolitic, patches containing fish scales and bones, in the oil shales on portion 190, parish of Warner, some two miles west of Strathpine railway station, and approximately one mile N.W. of the sandstone outcrop referred to above. Shortly after this, Ball (1932b, p. 384) also discovered numerous small kidney-shaped bodies identified by Whitehouse as ostracods allied to the common freshwater genus *Cypris*, together with fragmentary fish remains, some fruits of indeterminable plants and one small gastropod, in the shales on the spoil heap of Simpson's well in the N.E. corner of portion 186, parish of Nundah, about one mile E.S.E. of Bald Hills. Subsequently Chapman (1932, p. 384) reported on the ostracods contained in this material, and stated that their generic affinity was very obscure and that they could be referred to as (?)Cyprids only. In 1934 E. S. Hills (p. 169) described the fragmentary fish remains collected by Ball from the oil shales two miles W. of Strathpine, and from Simpson's well E. of Bald Hills, as belonging to a freshwater Percoid fish, probably of the genus *Percalates*. The very fragmentary nature of the material, however, was insufficient to indicate more than that the shales were of Tertiary age.

This rather small assemblage represents the complete list of fossils previously recorded from the Petrie Series. The discovery of additional fossil plants, invertebrates, and fish remains is therefore of some importance.

The most interesting collection has been obtained from the steeply dipping low-grade oil shales which outcrop on the southern bank of the South Pine River just below Roghan road pumping station, on portion 127, parish of Nundah. This assemblage includes numerous fragments of fossil Eucalypt leaves including one entire well preserved leaf which, according to C. T. White (1942), bears a very strong resemblance to *Eucalyptus propinqua,* the "grey gum," which is quite common in the district to-day. At least two other species of the genus *Eucalyptus* are also represented in this fossil flora, but, because of their presence only as leaf fragments, identification or comparison with either fossil or recent species of this genus is impracticable. On the same horizon has been found a probable fossil insect gall, the first, as far as can be ascertained, to be recorded from Australia, although they are not uncommon in the Tertiary flora of the United States. As insect galls are quite common on gum and other leaves to-day, the association with fossil Eucalypts in these beds is of particular interest. Several small seed-like bodies and one fragment of an indeterminate dicotyledonous leaf have also been collected from these shales. The most abundant fossils, however, are sedges, which, according to S. T. Blake (1942), appear to belong to the present day genus *Eleocharis,* and possibly to the species *Eleocharis equisetina* Presl, which they very closely resemble. Apart from this flora, a number of fragmentary fish remains, including generally isolated vertebrae and other bones, spines, and scales, have been found in the low-grade oil shale, as well as a cast of the right valve of an oval-shaped Unionid, which most resembles in shape the present day form *Velesunio balonnensis* (Conrad). Probable fossil worm castings, tracks and burrows also are quite common in these shales, but, although an intensive search was made, no ostracods or insects could be discovered.

A small collection of dicotyledonous leaves has also been obtained from the steeply dipping sandstones and shales which outcrop about one and a-half miles W. of Strathpine in the vicinity of portion 256, parish of Warner, and C. T. White (1942) has stated that several of them resemble leaves of the following living genera:—*Gmelina, Acacia, Melaleuca,* and *Callistemon.* Probable worm castings or infilled tracks were also found in these biscuit-coloured shales. Further specimens of dicotyledonous leaves, some with the cuticle preserved, have been collected from the greyish-coloured sandstones and oil shales from Neill's shaft nearby. Apart from these, casts of two valves of elongate shaped Unionids were found in the sandstone, and one in the oil shale which immediately underlies it. Unfortunately, they are all too poorly preserved to allow comparison with either fossil or recent forms. A certain amount of coalified plant material is associated with the low-grade oil shale brought up from Neill's shaft, and, protruding upwards across the laminations of the shale, not uncommonly are found what are thought to be the mud infillings of the internal cavity of fossil sedges preserved in their growing positions.

In addition to the fossils recorded by L. C. Ball (1932, p. 221) from portion 190, parish of Warner, the writer has also found numerous impressions of fossil sedges in the very slickensided shale brought up from a shaft recently sunk some 15 feet N.E. of the old well referred to above. Moreover, as with the oil shales from Neill's shaft, indeterminable carbonised plant remains, such as stem fragments, were observed in much of the oil shale examined at this locality also.* Several specimens of dicotyledonous fossil wood were also collected from this property, and radial and transverse sections of these have shown them to possess Eucalypt affinities.

Some two miles to the N.E. of the above locality, fragments of fossil sedges similar to those found in the shales on the bank of the South Pine River were observed in the shale which has been brought up recently in putting down a bore for water on subdivision 1 of portion 41, parish of Warner, about 8 chains south of Lawnton railway station.

Approximately a-quarter of a mile further to the N., on Houghton's Nursery, in portion 24, parish of Warner, another bore has recently been sunk, and an examination of the material brought up has revealed the presence of ostracod remains in a greenish-grey bituminous shale, reported to have been met at a depth of about 45 feet. Unfortunately, the material has been very much crushed and mashed up by percussion drilling, but microscopic examination has revealed a number of the isolated carapace valves of fossil ostracods. At least three distinct species of Cypridiferous ostracods have been recognised, all of which have been identified with species to be described shortly by the writer from the Tertiaries of The Narrows, near Gladstone. It might here by mentioned that this is the most northerly locality in the Petrie Series where the writer has found fossils to confirm the Tertiary age of the strata.

Rather more than a mile to the S.S.E. of the above locality a 55-feet well has lately been sunk, in the grounds of Francis' Cornflour Factory, in the southern part of portion 12, parish of Warner, near Four Mile Creek. The material on the spoil heap of this well, however, has proved to be practically unfossiliferous, an intensive search resulting in the discovery of only one fossil—a fragment of a dicotyledonous leaf, found in light grey sapropelic shale.

On the other hand, shale rich in ostracod remains was found about the opening of an old bore on Brecknell's Farm, Samsonvale road, Strathpine. This bore, which is reported to have been sunk in 1939 to a depth of 178 feet, is situated on subdivision 10 portion 222, parish of Warner, approximately half-a-mile S.S.W. of the Cornflour Factory. Unfortunately, no log was prepared during the drilling, and F. S. Brecknell, the owner of the property, could only say that the ostracod-bearing shale had come from below a depth of 60 feet. Moreover, as much of the shale examined on the spoil heap was found to contain ostracods, it is certain that quite a considerable thickness was passed through in boring, probably in several separate layers. In contrast with the greenish shale also present, the ostracod-bearing shale is generally of a bluish-grey colour, and fissile. In some cases, also, the bedding planes are so packed with the white chitino-calcareous carapace valves that other material is almost virtually excluded. Unfortunately, most of these valves are very crushed and broken, but microscopic search has revealed a number of well preserved, identifiable specimens. Four distinct species have already been recognised, probably the most abundant being *Erpetocypris aequalis* Chapman, originally described from the Redbank Plains Series. Two of the four species, in fact, are

* Since this paper went to press fossil ostracods have also been found in some of the oil shale from this locality.

identical with species occurring in the Redbank Plains Series, while both of the other forms have been identified with species shortly to be described from the Tertiary shales of The Narrows, near Gladstone. The significance of these ostracods as criteria of age will be briefly considered below.

It might also be mentioned that, according to the drilling contractor, R. C. Abbott (1943), another bore has been put down several hundred yards to the east of Brecknell's bore, on portion 11, parish of Warner. This bore, which is just east of Gympie road, is reported to have been sunk to a depth of 305 feet, mainly through greenish and bluish shales. From its location and depth there seems little doubt that some of the shales passed through contain fossil ostracods.

Finally, the writer has collected fish spines and several isolated vertebrae from biscuit coloured shales which outcrop on the western side of Norris road, between Beams and Roghan road, approximately one and a-half miles S.E. of Bald Hills.

With reference to the complete assemblage of fossil dicotyledonous leaves collected from the Petrie Series, it must be admitted that they are, unfortunately, of very little value at present for purposes of age determination. Owing to the generally confused state of Tertiary palaeobotany in Australia, together with the ever-present doubt of determinations based on isolated leaves alone, any serious attempt to name and describe the individual members of this relatively small collection of fossil leaves would be impracticable at the present time. Moreover, many of the leaves are incomplete, and taxonomic work on such fragmentary material is particularly hazardous, and always of very doubtful value. It must also be pointed out that none of the above localties in the Petrie Series can be compared for richness in dicotyledonous leaves with such localities as Ebbw Vale and other places in the Redbank Plains Series. Indeed, while the large and rich Redbank Plains flora is still awaiting systematic description, any attempt to describe in detail the small assemblage of dicotyledonous leaves collected from the Petrie Series would be palaeobotanically shortsighted. From the work already carried out, however, it seems that the flora is predominantly a "*Eucalyptus*" one, and, as such, distinct from the "*Cinnamomum*" flora of the Redbank Plains Series. In fact, not one specimen of *Cinnamomum* has yet been found in the Petrie Series, the great majority of the dicotyledonous leaves belonging to the genus *Eucalyptus*. This may suggest a somewhat closer relationship between the Petrie Series and the present-day flora than that between the Redbank Plains and the existing flora, but naturally at the present stage no definite statement can be made in this connection. It can quite definitely be said, however, that the flora does show a very close affinity with the present-day flora of South-Eastern Queensland, and accordingly, contrary to von Ettingshausen's generalisation (1883) concerning the Australian Tertiary flora as a whole, it is not distinct from the living flora of the area. It might be mentioned that this observation has been made by both C. T. White and S. T. Blake (1942) in a verbal report to the writer on the fossil plants collected from the Petrie Series. Furthermore, since the resemblances are so striking, it seems unlikely that the comparisons with present-day genera have been carried further than justified.

With reference to the fossil sedges collected from the several localities, determinations are likewise somewhat doubtful at present. It may be noted, however, that members of the family *Cyperaceae*, to which the genus *Eleocharis* belongs, are rare as fossils in the early Tertiary, becoming more abundant in middle and late Tertiary times. This is quite a pertinent point in view of the fact that no sedges have been recorded from the Redbank Plains Series, which is probably of Oligocene age (Hills, 1934), while in certain horizons of the Petrie Series they have been found to be the predominating element in the fossil flora. Indeed, this alone is suggestive of an age for the Petrie Series younger than that of the Redbank Plains Series.

It might be mentioned at this stage that the palaeobotanical study of Tertiary fossil seeds has lately been found to afford a very delicate and reliable guide to stratigraphical correlation. This is of interest here because seeds of indeterminable plants have already been found near Bracken Ridge, and, if a sufficiently large number of well preserved specimens can be collected from this and other localities in the Petrie Series, a field for future research will be opened up, which may subsequently prove of greater stratigraphical value than the isolated angiospermous leaves.

Unfortunately, the several fossil Unionids found in the Petrie Series are at present of no greater value as criteria of age than the plants. As a family of the Prionodesmacea, the Unionids are long ranged, extending from the Triassic to Recent, but not becoming abundant till Cretaceous and Tertiary times. Moreover, no Tertiary fossil members of this family have yet been described from Queensland, although they have already been found in most of our Tertiary lacustrine basins. When a detailed palaeontological study of Australian Tertiary Unionids has been carried out, however, and the geological ranges of the various species determined, our Queensland representatives should prove of stratigraphical value. In the meantime the two distinct species already found in the Petrie Series can only be compared with the recent forms, *Velesunio ballonensis* (Conrad) and *Hyridella australis* (Lamarck).

On the other hand, the ostracods collected from the Bald Hills, Strathpine, and Lawnton localities mentioned above have already proved to be of some stratigraphical value. Considered as a whole the ostracod fauna shows a very close affinity with that contained in the Tertiary shales of The Narrows near Gladstone. It might be mentioned here that E. S. Hills (1943) has recently determined, from a study of the fossil fish fauna, that The Narrows Tertiaries are younger than the Redbank Plains Series, and probably Miocene in age. The Petrie Series ostracod fauna, however, also shows some affinity with that from Redbank Plains, probably the most striking point being the relative abundance of *Erpetocypris aequalis*. It must be borne in mind, however, that many of the simple, smooth-shelled Cyprids are long ranged, so that in evaluating the ostracoda as a criteria of age it is necessary to consider all members of the fauna. When this is done a much closer relationship becomes evident between the Petrie Series Ostracoda and those from The Narrows than between the former and those from Redbank Plains. However, as the writer is at present preparing a paper on the Ostracoda contained in various Queensland Tertiary deposits, which will incorporate a detailed account and description of the various species found in the Petrie Series, the above general statements only are made here.

Only a small assemblage of fragmentary fish remains has yet been collected from the Petrie Series. However, as much of the material appears to be excellently preserved in bituminous shale, it might be possible for a palaeoichthyologist to make sufficient generic determinations to indicate the general faunal characteristics of the assemblage. With this in view, and considering the stratigraphical value of the Tertiary fossil fish from other Queensland deposits (Hills, 1934, 1943), an attempt is now being made to enlarge the assemblage by further collecting in the area.*

In conclusion, purely on the above palaeontological evidence, which is still rather fragmentary, it seems that the Petrie Series is definitely younger than the Redbank Plains Series, and the age may be tentatively put as Miocene. It is felt, moreover, that the ostracods at present undergoing systematic description, and the ultimate description of the fossil fish fauna, may help to provide a more delicate and reliable guide to the precise age of the series.

V. THE STRATHPINE OIL SHALE.

Oil shale was discovered in the Strathpine district on the spoil heap of an old well on portion 190, parish of Warner, by L. C. Ball in 1932. This property lies just two miles W. of Strathpine railway station, which is fourteen miles by rail N. of Brisbane on the main northern line. The well, which was sunk in 1919 on the site of a 50-feet bore hole, is reported to have passed through 5 feet of loose sandstone boulders, then 50 feet of ferrated shale and finally 5 feet of oil shale. A quantity of the oil shale is still available on the spoil heap of the well, and Ball (1932a, p. 221) has stated that it is "almost identical in appearance with that occurring at The Narrows, between Gladstone and Rockhampton." It has the same dark greenish-grey colour when fresh; it is weather-resistant but ultimately oxidises to the same biscuit colour; it is tough and resilient to the hammer, and it has a dark brown greasy streak. Moreover, it is sectile, has a low specific gravity, and burns fairly readily with a smoky yellow flame giving off the characteristic odour of oil shale. A sample of this material submitted to the Government Analyst in 1932, is reported to have yielded crude oil at the rate of 51 gallons per ton. This is an unusually high yield for an oil shale of Tertiary age, and seemingly indicates the presence of a "pocket" of relatively rich shale, probably of restricted extent, as at no other place in the Petrie Series has oil shale of this quality since been discovered.

The shale outcrops about one chain N. of the well and can be traced in a N.N.W. direction for a distance of several chains, being generally coincident with the strike of the beds. The average angle of dip is 45 degrees to the W.S.W., although the outcropping beds at one place are almost vertical. Moreover, as the material is very much slickensided the presence of faulting is clearly pointed to.

Oil shale also outcrops in steeply dipping strata associated with a reversed fault on the bank of the South Pine River, on portion 127, parish of Nundah, but is of very low grade. It has also been met with still further towards the south-eastern boundary of the series, in two bores. One, in the south-eastern corner of portion 148, parish of Nundah, near the corner of Beams and Lacey road, and the other in the grounds of Hutton's Bacon Factory at Zillmere, on portion 5, parish of Nundah. In the former case, according to L. G. Neill (1943), a 2 ft. 6 in. seam of

* Since this paper went to press additional fossil fish material has been collected from the shales outcropping on the bank of the South Pine River, and the whole collection has been sent to Dr. E. S. Hills of the University of Melbourne, who has kindly undertaken its description.

oil shale, which yielded approximately 30 gallons of crude oil per ton was passed through; while, in the latter case, the general appearance of the shale submitted by O. A. Jones indicates a probable yield of about 20 gallons per ton.

Some time ago a shaft, known as Neill's Shaft, was put down on portion 256, parish of Warner, about one and a-half miles S.E. of the old well on portion 190, to test the oil shale deposit in that area. Oil shale associated with a minor amount of brown coal was met with at approximately 70 feet and sinking was stopped at 75 feet. The shales here again are steeply dipping and very slickensided.

The oil shale from Neill's shaft is, unfortunately, low grade, picked samples yielding only 12 gallons of crude oil to the ton. I am indebted to M. H. Gabriel, of the Government Chemical Laboratory, for the following proximate analysis:—

	Per cent.
Moisture	6·3
Volatile Matter	18·2
Fixed Carbon	5·2
Ash	70·3
Nitrogen	0·42

This compares very closely with such other Queensland Tertiary oil shales as those of The Narrows near Gladstone.

According to Gabriel the specific gravity of the water-free oil from this oil shale is ·948 at 22 degrees C. Moreover, the oil has a low gasoline content, the distillate to 200 degrees C., which is the naphtha and gasoline content, being only 7 per cent. It might be mentioned that the gasoline content of a typical shale oil varies between 16 and 26 per cent. On the other hand the kerosene content, which distills at between 200 and 275 degrees C., is 21 per cent., which is slightly higher than that of a typical shale oil which gives from 16 to 20 per cent. kerosene. It might also be said that the high specific gravity of the crude oil suggests an asphaltic base, which is sometimes taken as being indicative of a partial animal origin for the oil.

The oil shale, itself, is a fine-grained, even-textured, laminated rock, greenish-grey in colour, with a dull lustre, greasy brown streak, hackley fracture, and a specific gravity of 1·48. The presence of numerous mud infillings of the internal cavity of fossil sedges protruding upwards across the laminations of the shale, points to shallow water conditions of sedimentation for the oil shale.

Low grade oil shale has also been met in several bores, sunk for water, in other parts of the Petrie Series. According to R. C. Abbott, the drilling contractor (1943), shale yielding approximately 10 gallons of crude oil was passed through, in putting down a bore for water, on portion 11, parish of Warner, near Four Mile Creek. Low grade oil shale has also been noticed by the writer on the spoil heap of Brecknell's bore in portion 222, parish of Warner, while the light grey, greasy shale brought up in sinking Francis' well on the Cornflour Factory property certainly would yield a few gallons of crude oil to the ton. L. C. Ball, moreover, has reported (1932, p. 384) "paper shales yielding on destructive distillation about 3 gallons of brown, limpid oil per ton" from Simpson's well in portion 186, parish of Nundah, near Bracken Ridge.

In conclusion, it seems that the yield of crude oil from typical Strathpine oil shale varies between 5 and 20 gallons to the ton. That is, it is mainly a low grade oil shale. Moreover, it seems that the seams, instead of being continuous throughout the series, may be of restricted areal extent and generally lenticular in shape. To determine the quantity of oil shale present, furthermore, a systematic boring campaign would have to be undertaken, and this, in view of the low-grade nature of the material, the relative thinness of the seams, and their steeply dipping nature, does not appear to be warranted at the present time. It must be presumed, however, that the steep dip of the outcropping oil shale referred to above decreases progressively as one proceeds away from the faulting, but this diminution in angle of dip may only be gradual, and so, even disregarding the nature of the material, mining operations would hardly prove economically feasible. In fact, the only favourable factor about the Strathpine oil shale is the convenient geographical location of the deposit, so close to the city of Brisbane.

VI. GENERAL STATEMENTS AND ACKNOWLEDGMENTS.

A number of other observations, which seem worthy of record, have been made during the course of geological work in this area.

A considerable amount of greenish-white impure limestone has been found on the spoil heap of Francis' well on portion 12, parish of Warner, near Four Mile Creek, and similar limestone has been collected from Brecknell's bore, approximately half-a-mile to the S.S.W. From the rough log provided by Francis and the relative proportions of the various rock types on the spoil heap it would seem that approximately 8 to 10 feet of this limestone was passed through in sinking the 55-feet well. Similar impure limestone has also been brought up (Ball, 1932, p. 384) from Simpson's well in portion 186, parish of Nundah, near Bracken Ridge, the bed here being 12 feet in thickness. As freshwater limestone is really not a common rock, and seeing that it is a prominent member of the Silkstone Series, to which Whitehouse (1940, p. 34) has recently given a provisional Miocene age, it was thought by the writer that these two limestones might possibly be comparable in geological age. Unfortunately, macroscopic and microscopic search failed to reveal any recognisable fossils in the Petrie Series limestone, so chemical analysis was resorted to in an attempt to show up any possible relationship. I am indebted to M. H. Gabriel, of the Government Chemical Laboratory, for the following analysis of the Petrie Series limestone, the results of which show a very close resemblance to those given by Dunstan (1913, p. 648) for the Silkstone Series limestone:—

	Petrie Series Limestone. (Simpson's Well, Bald Hills.)	Silkstone Series Limestone. (Limestone Hill, Ipswich.)
	Per cent.	Per cent.
Moisture	1·1	0·4
Loss on Ignition	43·4	43·8
Silica	6·7	5·7
Iron Oxide	1·7	0·9
Alumina	1·1	1·1
Lime	26·8	27·5
Magnesia	19·2	20·6
	100·0	100·0

Although correlation on lithological grounds is generally insufficient, such a close chemical comparison between the two limestones suggests that the Petrie Series may be equivalent, at least in part, to the Silkstone Series. This fits in with all the palaeontological evidence and other lithological evidence from the Petrie Series, which points definitely to an age later than that of the Redbank Plains Series.

The rock, itself, is a somewhat chalky, non-crystalline, dolomitic limestone, and, like that of the Silkstone Series, was presumably deposited in a time of little rainfall, when the waters of the basin were sufficiently charged with lime to precipitate calcium carbonate. It is undoubtedly the product of the earliest (? Middle Miocene) occasion upon which Tertiary limestones of non-marine origin were formed in Queensland (v. Whitehouse, 1940). Although this limestone may have quite a large areal extent in the Petrie Series, it outcrops nowhere in the series, and is never likely to be of economic importance.

A tentative Miocene age for the Petrie Series is also supported somewhat by the presence of diatomaceous earth in the series (v. Jones, 1927), as a study of the literature on the subject has revealed the fact that diatoms were most prolific in Miocene times. It might be mentioned that diatomaceous earth has not been found in the Redbank Plains Series.

Moreover, from the state of consolidation of the sediments, an age much later than Miocene for the Petrie Series seems to be unlikely.

Finally, it seems certain that the clays, in which the series is particularly rich, and not the oil shales, will eventually prove to be of greatest economic importance in the Petrie Series.

This work has been carried out by the writer in part while an honours student within the Department of Geology, University of Queensland, and in part during the tenure of a research fellowship within the University of Queensland, financed by Commonwealth funds through the Council for Scientific and Industrial Research. He would like to thank Mr. O. A. Jones and Dr. W. H. Bryan for their helpful advice, and Professor H. C. Richards for his personal interest in enabling him to carry out this work. He is also indebted to Mr. N. J. de Jersey for the determinations of the several fossil woods, and to Messrs. C. T. White and S. T. Blake for examining the small collection of Tertiary fossil plants.

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FIG. 1.—Tilted strata on upthrow side of reversed fault, South Pine River.

FIG. 2.—Steeply dipping low-grade oil shales outcropping on bank of South Pine River.

FIG. 3.—Neill's Oil Shale Shaft, 1½ miles west of Strathpine railway station.

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The Royal Society of Queensland.

Report of Council for 1942.

To the Members of the Royal Society of Queensland.

Your Council has pleasure in submitting the Annual Report for the year 1942.

Nine original papers, of which six were read or tabled at Ordinary meetings, were accepted for publication in the Proceedings, two symposia were held, two addresses given, and three evenings were devoted principally to exhibits and lantern lectures. The average attendance was forty.

The Chief Secretary's Department has agreed to pay a £1 for £1 subsidy for printing on Papers 7-13 published in Volume LIII. of the Proceedings and judged of value from a Governmental point of view. The Council acknowledges this subsidy with gratitude.

There are 4 honorary life members, 4 life members, 3 corresponding members, 189 ordinary members, and 5 associate members in the Society. This year the Society has lost one member killed on active service and one by resignation, while 4 have been elected to ordinary membership and 2 to associate membership. A number of members are engaged on active service, and others are engaged in special work for the war effort.

Attendance at Council meetings was as follows:—D. H. K. Lee 5, H. R. Seddon 6, J. Bostock 6, E. W. Bick 9, D. Hill (resigned July) 4, M. Scott 6, K. Watson 5, A. K. Denmead 1, S. T. Blake 9, I. R. Bick 8, W. H. Bryan 7, R. W. H. Hawken 4, H. J. G. Hines 7, F. A. Perkins 4.

DOUGLAS H. K. LEE, President.

M. I. R. Scott, Hon. Secretary.

THE ROYAL SOCIETY OF QUEENSLAND.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR YEAR ENDED 31ST DECEMBER, 1942.

Cr. **Dr.**

RECEIPTS.

	£ s. d.
Balance in Commonwealth Bank, 31st December, 1941	118 12 2
Subscriptions	161 17 6
Sales Reprints	2 17 9
Interest on Commonwealth Loan	4 11 3
Savings Bank Interest	3 1 3
Refreshments Account, Collections	3 14 6
Exchanges	0 6 8
	£295 1 1

EXPENDITURE.

	£ s. d.	£ s. d.
Government Printer—		
Abstracts and Report		11 1 9
Volume	354 10 3	
Less Government Subsidy	150 0 0	
		204 10 3
Stationery		2 1 11
Brett and Co., Timber (Library)		5 0 0
Bryce and Co., Freight and Cartage		0 17 6
State Government Insurance (Library)		0 19 2
University, Refund Postage		1 11 9
Hon. Secretary, Postages		18 17 9
Hon. Treasurer, Postages and Duty		2 0 0
Refreshments		5 2 0
Balance in Commonwealth Bank		42 19 0
		£295 1 1

Examined and found correct.

L. P. HERDSMAN, Hon. Auditor.

E. W. BICK, Hon. Treasurer.

22nd February, 1943.

Abstract of Proceedings, 29th March, 1943.

The Annual Meeting of the Society was held in the Geology Department of the University on Monday, 29th March, 1943, under the distinguished patronage of His Excellency Sir Leslie Wilson. The Chair was occupied by the President (Prof. D. H. K. Lee), who welcomed His Excellency on behalf of the Society. Twenty-six members and friends were present. The minutes of the previous annual meeting were read and confirmed. The President thanked those members who assisted in moving that portion of the Society's Library from the basement, where it had been housed for safe keeping a year ago, back to the Society's Room. The Annual Report was read and adopted. The Balance-sheet was received.

The following officers and Council were elected for 1943:—President, Prof. J. Bostock; Vice-Presidents, Prof. D. H. K. Lee and Mr. F. A. Perkins; Hon. Treasurer, Mr. E. W. Bick; Hon. Secretary, Miss M. I. R. Scott; Hon. Librarian, Mr. I. R. Bick; Hon. Editors, Mr. S. T. Blake and Dr. M. F. Hickey; Members of the Council, Dr. W. H. Bryan, Mr. H. J. G. Hines, Mr. E. M. Shepherd, Prof. T. G. H. Jones, and Mr. Colin Clark; Hon. Auditor, Mr. L. P. Herdsman.

The Presidential Address, "Terra Australis Rediviva," was delivered by Prof. D. H. K. Lee. His Excellency moved a vote of thanks, and the motion was supported by Dr. W. H. Bryan and carried by acclamation.

Abstract of Proceedings, 28th April, 1943.

The Ordinary Monthly Meeting of the Society was held in the Department of Geology of the University on Wednesday, 28th April, with Mr. F. A. Perkins (Vice-President) in the chair. About sixty members and friends were present. The minutes of the previous meeting were read and confirmed. Mr. D. A. T. Gasking and Dr. Jarvis Nye were elected to Ordinary Membership, and Dr. D. P. Hannaford Schafer, Mr. Thomas M. B. Elliott, and Mr. C. L. Daniels were proposed for membership.

Dr. W. H. Bryan exhibited a set of Benioff seismographic instruments recently acquired by the Commonwealth Government, which, originally intended for the Vulcanological Observatory at Rabaul, are to be used in the Seismological Station of the University of Queensland. The instruments consist of three seismographs (to record North-south, East-west, and Vertical components respectively) and a Benioff Recorder, on which the three components are recorded simultaneously on three drums carrying 35 m.m. cinematograph films. The seismograms are so finely recorded that microscopic examination is necessary, and for this purpose a travelling binocular microscope is included in the equipment.

Miss M. Scott demonstrated an apparatus for collecting alveolar air in the rabbit. The principle of the apparatus was explained and a demonstration of its working given.

Prof. D. H. K. Lee demonstrated the commercial instrument for multiple measurement of temperature by means of the thermocouple. In doing so he stressed the necessity for understanding the working and checking possible errors in the use of even simple instruments.

Mr. Thomas M. B. Elliott discussed old and modern types of Electrocardiographic units. Several makes were explained and the galvanometers attached described in detail. The lecturer, by use of circuit drawings, showed how the patient was connected to the apparatus and the heart beats recorded photographically on a moving film. The various portable electrocardiograph units were demonstrated.

Dr. D. P. Hannaford Schafer indicated the clinical uses of the electrocardiograph. He said its chief function was in the interpretation of various cardiac rhythmic irregularities and coronary thrombosis. Various mechanisms and rhythmic irregularities and coronary occlusion were illustrated by slides. It was mentioned that the electrocardiograph had become a great aid to clinical diagnosis, but its use is a corollary and not a substitute for a careful history and clinical examination of the patient.

Mr. E. S. Edmiston demonstrated features of a new metallographic microscope and briefly explained the technique of polishing and etching metal sections. A number of typical ferrous and non-ferrous sections were on view.

Abstract of Proceedings, 31st May, 1943.

The Ordinary Monthly Meeting of the Society was held in the Department of Geology of the University on Monday, 31st May, with the President (Prof. J. Bostock) in the chair. About thirty members and friends were present. The minutes of the previous meeting were read and confirmed. Dr. D. P. Hannaford Schafer, Mr. Thomas M. B. Elliott, and Mr. C. L. Daniels were elected to Ordinary Membership, and Dr. Alan Lee was proposed for Ordinary Membership and Mr. N. J. de Jersey for Associate Membership.

A symposium on ''Vitamins'' was held. Introducing the subject, Prof. T. G. H. Jones outlined the extraordinarily rapid rate of development in this field, especially during the last 15 years, as a result of close co-operation between chemists, physiologists, and nutrition experts.

Mr. I. R. Bick discussed the chemistry of the vitamins, pointing out that many of them have now been synthesised by the chemist and are available commercially.

Mr. H. J. G. Hines continued the discussion from a physiological point of view, and described the function of the vitamins in the human and animal systems.

Dr. O. S. Hirschfeld said that the practical value of all the accumulated knowledge of vitamins lay, not in their use as individual substances, but in the enormous advances that have been brought about in dietetics, both in health and disease. If we ate a ''wholemeal'' consisting of milk, butter, cheese, meat, green vegetables, fresh fruit, and wholemeal bread, not only was there an adequate supply of vitamins but also of all essential food factors.

Abstract of Proceedings, 28th June, 1943.

The Ordinary Monthly Meeting of the Society was held in the Department of Geology of the University on Monday, 28th June, at 8 p.m., with Mr. F. A. Perkins (Vice-President) in the chair. About seventy members and friends were present. The minutes of the previous meeting were read and confirmed. Dr. Alan Lee and Mr. N. J. de Jersey were elected to Ordinary and Associate Membership respectively. Mr. E. B. da Costa was nominated for Ordinary Membership.

Prof. T. G. H. Jones gave an address on "Synthetic Rubber." The properties of natural rubber were first of all discussed and the nature of the fundamental unit isoprene indicated. A brief account of the historical aspects of attempts to produce substances with the physical properties of natural rubber was given and the chemical structures of the various types of synthetic rubbers outlined. The importance of butadiene as a starting point and the use of copolymers along with this substance was stressed. Consideration was given to the possibility of producing synthetic rubber in Australia and the importance of alcohol as a raw material indicated. Comparison was made of the properties of natural and synthetic rubbers and the advantages and disadvantages of the synthetic products discussed. It was finally stated that extensive research which was being carried out at present would probably result in the production of new and better types of synthetic rubber, which might eventually result in the partial or even complete displacement of natural rubber for many purposes.

Abstract of Proceedings, 26th July, 1943.

The Ordinary Monthly Meeting of the Society was held in the Department of Geology of the University on Monday, 26th July, at 8 p.m., with the President (Prof. J. Bostock) in the chair. About thirty-five members and friends were present. The minutes of the previous meeting were read and confirmed. Mr. E. B. da Costa was elected to Ordinary Membership, and Misses Dorothy Haenke and Irene Tilse were proposed for Associate Membership.

Three sound films dealing with the House Fly, the Louse, and the Mosquito respectively were shown. Each film dealt with the habits of the insect in relation to disease, and the preventive and remedial measures being utilised at present, especially under army conditions.

Mr. F. A. Perkins gave a brief lecture on some of the developments with regard to mosquitoes during the last two or three years. He drew attention to gaps in our knowledge of the systematics of Queensland mosquitoes and illustrated this by reference to the recent epidemic of malaria at Cairns, during which it was discovered for the first time that the well-known carrier of malaria, *Anopheles punctulatus* var. *moluccensis,* is established in North Queensland. He also drew attention to the fact that one of the most successful methods of controlling mosquitoes is the use of pyrethrum sprays against adult mosquitoes. He pointed out that the effect of malaria on Australian and American troops, the recent epidemics of malaria and dengue in Queensland, and the heavy infestation of salt water mosquitoes in coastal towns during the last summer have drawn the attention of the members of the community to the mosquito problem. This increased interest has stimulated the Government to form a National Mosquito Control Committee and to make available to that Committee the sum of £4,500 to carry out a research and educational programme. The research work and some of the educational programme is to be carried out at the University. One of the aims of the Committee is to make the members of the community conscious of their obligations with regard to mosquito control as individuals, as residents in a shire or council, and as citizens of the State.

Abstract of Proceedings, 30th August, 1943.

The Ordinary Monthly meeting of the Society was held in the Department of Geology of the University on Monday, 30th August, at 8 p.m., with the President (Prof. J. Bostock) in the chair. About twenty-five members and friends were present. The minutes of the previous meeting were read and confirmed. Misses D. Haenke and I. Tilse were elected to Associate Membership, and Mr. Erskine, Mr. J. E. Cary, and Mr. L. McGrath were proposed for Ordinary Membership.

Prof. H. J. Wilkinson gave a paper on the anatomy of dental caries. In this he gave a concise account of the structure and development of the teeth and of dental tissues, pointing out the vulnerable features in tooth structure and the possible defects of development predisposing to the onset of dental caries.

Prof. S. F. Lumb gave a paper on dental caries. In discussing this he said, "Dental caries is a disease and the most widespread of all diseases. Investigation, both statistical and scientific, has been intense. When all the data that have accumulated are analysed the majority of research will fall into two main headings—General or Predisposing Causes and Local or Exciting Causes. Under General or Predisposing Causes consideration has been given to the following:—Immunity, Heredity, Climate, Race, Community, Physical Condition, Age, Sex, Chemical Constituents, Endocrine Glands, and Nutrition. While these factors may have an influence—e.g., Endocrine Glands control metabolism, growth, calcium deposition, &c.—the outstanding factor would seem to be nutrition, and this has been proved to be only efficacious during the histological and embryological developmental period of the enamel. The tooth can only be affected in a general manner by nutrition during the developmental period; this produces poorly developed or hypoplastic teeth but not caries. The Local or Exciting Causes have been investigated under the following headings:—Hardness of Tooth Structure, Developmental Defects of Jaws and Teeth, Tooth Form, Function, Tooth Arrangement, Saliva, Oral Flora, and Diet. While all these factors may appertain to some degree, the outstanding factors are—Oral Flora, Diet, and Saliva. The Oral Flora contains acid forming bacteria. Of the foods the ultra-refined carbohydrate form the substrate for the Flora to act on and the saliva assists in cases by the lowering of its H.P. Thus the question of Immunity depends on the absence of acid forming Oral Flora or the substrate—carbohydrate. To try and remove the pathogenic Oral Flora is impossible, hence the control is in the elimination or modification of carbohydrate in the diet —that is, a balanced or orderly diet."

Abstract of Proceedings, 27th September, 1943.

The Ordinary Monthly Meeting of the Society was held in the Sir William Macgregor School of Physiology on Monday, 27th September, at 8 p.m., with the President (Prof. J. Bostock) in the chair. About forty members and friends were present. The minutes of the previous meeting were read and confirmed. Mr. Erskine, Mr. J. E. Cary and Mr. L. McGrath were elected to Ordinary Membership, and Mr. H. V. Brown was proposed for Ordinary Membership.

Prof. D. H. K. Lee demonstrated an apparatus—Efficiency Tester: Gunlaying type—designed and constructed in the Physiology Department with the assistance of G. Klemm. This records the speed with which a test subject can successfully lay a telescopic sight on a target or series of targets. The lighting-up of the selected target and the successful laying of the sight are recorded independently on a rotating drum, from which the time interval can be calculated.

Mr. C. T. White exhibited specimens of three species of *Duboisia.*

Mr. F. A. Perkins exhibited a specimen of *Ascaris* (*Pienis rapœ*), Cabbage Butterfly, which was caught by Mr. E. J. Dumigan at Toowoomba on the 14th March, 1943. This is the first record of this serious pest occurring in Queensland. No doubt, as in other countries, it will spread very rapidly and will continue to be a major pest of Cruciferous plants.

Mr. I. R. Bick demonstrated the phenomenon of rotary dispersion of polarised light on passing through a sugar solution. A polaroid disc was used to polarise the light.

Mr. J. Leeming Schofield exhibited a specimen of Rotenone prepared by the Agricultural Chemist's Section of the Department of Agriculture and Stock, obtained from roots of *Derris elliptica* var. Sarawak creeping, grown at the Bureau of Tropical Agriculture. He referred briefly to its special insecticidal properties and to chemical, agricultural, and marketing aspects of Derris root production. Reference was made to the classical selection work on Derris in Malaya carried out by Georgi.

Mr. D. Metcalfe demonstrated the use of the Industrial X-ray in the production of a sound steel casting.

Dr. W. H. Bryan exhibited a series of specimens illustrating colour in minerals. He pointed out that whereas some minerals have their peculiar and characteristic colours, many others display a wide range of colour. Some of the most striking colour effects were shown to be due to the presence of chemical impurities or physical imperfections.

Abstract of Proceedings, 25th October, 1943.

The Ordinary Monthly Meeting of the Society was held in the Department of Geology of the University on Monday, 25th October, at 8 p.m. with the President (Prof. J. Bostock) in the chair. About thirty-five members and friends were present. The minutes of the previous meeting were read and confirmed. Mr. H. V. Browne was elected to Ordinary Membership, and Messrs. J. D. East, H. C. R. Fogarty, H. L. Higginson and C. Jones were proposed for Associate Membership.

Dr. M. F. Hickey read a paper on "Vesalius, the Founder of Modern Anatomy," 1943 being the fourth centenary of the publication of the "De Fabrica." He sketched in the historical background of the time of Vesalius, gave an account of his life and work, indicating the importance of his work in the history of medicine and of science in general, and outlined the scope of anatomical inquiry to-day, with its tools ranging from the electron miscroscope to the palaeontologist's spade.

During the Dark and Middle Ages, not only was the factual content of Greek science lost, but the Greek spirit of observation and free inquiry disappeared also. In an age of dogmatism, Aristotle and Galen became authorities above question or criticism. Under the influence of Humanism and the Naturalism of Renaissance Art, the genius of the youthful Vesalius, by an appeal to the dissected human body, destroyed the authority of Galen and helped to free the human mind for its enormous advances in science. Vesalius founded modern descriptive anatomy, both in content and method of study. The spirit is still that of Vesalius; only the tools are improved.

The speaker stated that the "De Fabrica" was the basis of immediate advances in surgery; it made modern physiology possible. Not only is it the foundation of modern medicine as a science; but it is also the first great positive achievement of science itself in modern times, taking rank with the treatise of Copernicus "On the Revolutions of the Celestial Spheres" in altering the course of human thought.

Abstract of Proceedings, 29th November, 1943.

The Ordinary Monthly Meeting of the Society was held in the Department of Geology of the University on Monday, 29th November, at 8 p.m., with the President (Prof. J. Bostock) in the chair. About thirty-six members and friends were present. The minutes of the previous meeting were read and confirmed. Mr. J. D. East, Mr. H. C. R. Fogarty, Mr. H. L. Higginson, and Mr. C. Jones were elected to Associate Membership.

Prof. H. C. Richards gave an address on Geophysical Prospecting Methods for ores and oil. There has been a very considerable increase in the utilisation of these methods, particularly in U.S.A. and the

U.S.S.R., and Australia would be well advised to adopt these methods wherever possible. Some years ago, under Mr. Broughton Edge, there was conducted in the Commonwealth an investigation into the application of these methods to Australian occurrences. The general conclusions indicated that the methods were just as applicable here as elsewhere. Of recent years there has been a special development in the use of Ultra-Violet light in the detection of scheelite (Calcium tungstate)-bearing ore deposits and as this mineral is of especial importance in connection with the production of Tungsten carbide and Tungsten metal as powder, rod or filament it is of more than ordinary interest to Australia and especially to Queensland. A portable ultra-violet light apparatus operated by a 6-volt battery producing filtered ultra-violet light of a wave-length of approximately 2500Å is especially suitable and an illustration of the use of the apparatus was given during the address. Consideration was given to the geophysical tests grouped under magnetic, gravimetric, seismic both refraction and reflection, and electrical. The application of these methods to the discovery of ore deposits and to the determination of structures of especial significance to engineering geological problems in Australia was discussed. The manner in which such tests could have been used to advantage in connection with the Grey Street and Story Bridges in particular was shown and the great desirability of using the tests generally in developing the mining resources of the country was particularly pointed out.

Mr. H. A. Mitchell, the Chairman of the Brisbane Division of the Australian Institution of Mining and Metallurgy, expressed appreciation on behalf of the members of his Association for the invitation to be present and moved a vote of thanks which was seconded by Dr. E. O. Marks.

The following Institutions, Societies, etc., are on our exchange list, and publications are hereby gratefully acknowledged. Owing to war conditions, many of our exchanges have temporarily lapsed.

ARGENTINE—
- Universidad Nacional de la Plata.
- Universidad de Buenos Aires.

AUSTRALIA—
- Commonwealth Bureau of Census and Statistics, Canberra.
- Department of Agriculture, Melbourne.
- Department of Mines, Melbourne.
- Royal Society of Victoria.
- Field Naturalists' Club, Melbourne.
- Council for Scientific and Industrial Research, Melbourne.
- Australian Chemical Institute, Melbourne.
- Department of Mines, Adelaide.
- Waite Agricultural Research Institute, Glen Osmond.
- Royal Society of South Australia.
- Royal Geographical Society of Australasia, Adelaide.
- Public Library, Museum and Art Gallery, Adelaide.
- University of Adelaide.
- Standards Association of Australia, Sydney.
- Naturalists' Society of New South Wales.
- Department of Agriculture, Sydney.
- Department of Mines, Sydney.
- Royal Society of New South Wales.
- Linnean Society of New South Wales.
- Australian Museum, Sydney.
- Public Library, Sydney.
- University of Sydney.
- Botanic Gardens, Sydney.
- Australian Veterinary Society, Sydney.
- Queensland Naturalists' Club, Brisbane.
- Department of Mines, Brisbane.
- Queensland Museum, Brisbane.
- Department of Agriculture, Brisbane.
- Royal Geographical Society of Australasia (Queensland), Brisbane.
- Royal Society of Tasmania.
- Mines Department, Hobart.
- Mines Department, Perth
- Royal Society of Western Australia.
- North Queensland Naturalists' Club, Cairns.
- Department of Fisheries, Sydney.
- Technological Museum, Sydney.
- McCoy Society, Melbourne.
- National Museum, Melbourne.
- Australian Institute of Mining and Metallurgy, Sydney.
- State Statistician, Queensland.

BELGIUM—
- Academie Royale de Belgique.
- Societe Royale de Botanique de Belgique.
- Societe Royale Zoologique de Belgique.

BRAZIL—
- Instituto Oswaldo Cruz, Rio de Janiere.
- Ministerio de Agricultura Industria y Commercio, Rio de Janiero.
- Instituto de Biologia Vegetal, Rio de Janeiro.
- Universidade de Sao Paulo.

BRITISH ISLES—
- Royal Botanic Gardens, Kew.
- British Museum (Natural History), London.
- Cambridge Philosophical Society.
- Literary and Philosophical Society, Manchester.
- Leeds Philosophical and Literary Society.
- Royal Society, London.
- Conchological Society of Great Britain and Ireland, Manchester.
- Royal Empire Society, London.
- The Bristol Museum and Art Gallery.
- Imperial Bureau of Entomology, London.
- Imperial Agricultural Bureau, Aberystwyth.
- Royal Society of Edinburgh.
- Botancal Society of Edinburgh.
- Royal Dublin Society.
- Royal Irish Academy, Dublin.
- Rothamsted Experimental Station.

CANADA—
- Department of Mines, Ottawa.
- Royal Astronomical Society of Canada.
- Royal Society of Canada.
- Royal Canadian Institute.
- Nova Scotian Institute of Science.
- Department of Agriculture, Ottawa.

CEYLON—
- Colombo Museum.

CUBA—
- Sociedad Geografica de Cuba, Habana.
- Universidad de Habana.

DENMARK—
- The University, Copenhagen.

FINLAND—
- Societas pro Fauna et Flora Fennica, Helsinki.

France—
- Station Zoologique de Cette.
- Societe des Sciences naturelles de l'Ouest.
- Museum d'Histoire naturelle, Paris.
- Societe botanique de France.
- Societe geologique et mineralogique de Bretagne.
- Faculte des Sciences, Marseille.
- Societe entomologique de France.

Germany—
- Zoologisches Museum, Berlin.
- Gesellschaft fur Erdkunde, Berlin.
- Deutsche Geologische Gesellschaft, Berlin.
- Naturhistorischer Verein der preus. Rheinland und Westfalens, Bonn.
- Naturhistorisches Museum, Vienna.
- Naturwissenschaftlicher Verein zu Bremen.
- Senckenbergische Bibliothek, Frankfurt a. Main.
- Kaiserlich Deutsche Akademie der Naturforscher, Halle.
- Zoologisches Museum, Hamburg.
- Naturhistorisch-Medizinischer Vereins, Heidelberg.
- Akademie der Wissenschaften, Leipzig.
- Bayerische Akademie der Wissenchaften, Munich.
- Centralblatt fur Bakteriologie.

Hawaii—
- Bernice Pauahi Bishop Museum, Honolulu.

Holland—
- Technische Hoogeschool, Delft.
- University of Amsterdam.
- Royal Netherlands Academy.

Italy—
- Societa Toscana di Scienze Naturali, Pisa.
- Lab. di Entomologia Agraria, Portici.

India—
- Geological Survey of India.
- Agricultural Research Institute, Pusa.

Japan—
- Berichte der Ohara Institut, Kurashiki, Japan.
- Imperial University, Kyoto.
- Imperial University, Tokyo.
- National Research Council of Japan, Tokyo.
- Taihoku Imperial University.
- Tokyo Bunrika Daigaku.
- Agricultural Chemical Society of Japan.

Java—
- Koninkligk Naturkundige Vereeniging, Weltevreden.

Mexico—
- Instituto Geologico de Mexico.
- Sociedad Cientifica "Antonio Alzate," Mexico.
- Secretario de Agriculture y Fomento, Mexico.
- Observatorio Meterorologico Central, Tacaibaya.

New Zealand—
- Dominion Museum, Wellington.
- Royal Society of New Zealand.
- Auckland Institute and Museum.
- Dominion Laboratory, Wellington.
- Council for Scientific and Industrial Research, Wellington.
- Geological Survey of New Zealand.

Peru—
- Sociedad Geologica del Peru, Lima.

Philippine Islands—
- Bureau of Science, Manila.

Poland—
- Polskie Towarzystwo Przyrodnikow im Kopernika, Lwow.
- Societes Savantes Polonaises.
- University of Lwow.
- Museum Zool., Warsaw.
- Geological Institute, Warsaw.

Portugal—
- Academia Polytechnicada, Oporto.
- Sociedade Broterniana, Coimbra.
- Instituto Botanico, Coimbra.

U.S.S.R.—
- Academy of Sciences, Leningrad.
- Bureau of Applied Entomology, Leningrad.
- Laboratory of Palaeontology, Moscow.
- Lenin Academy of Agriculture Sciences, Leningrad.

Spain—
- Real Academia de Ciencias y Artes de Barcelona.
- Real Academia de Ciencias, Madrid.
- Museo de Historia Natural, Valencia.
- Academia de Ciencias de Zarogoza.

Sweden—
- Geological Institute of Upsala.
- Goteborgs Kungl, Vetenskaps.
- Kungl. Fysiografiska Sallskapets, Lund.

Switzerland—
- Societe de Physique et d'Histoire naturelle, Geneve.
- Naturforschende Gesellschaft, Zurich
- The League of Nations, Geneva.

South Africa—
- Geological Society of South Africa, Johannesburg.
- South African Museum, Capetown.
- Durban Museum, Natal.
- Transvaal Museum, Pretoria.
- Natal Museum, Pietermaritzburg.

GOLD COAST—
- Geological Survey.

UNITED STATES OF AMERICA—
- United States Geological Survey, Washington.
- Natural History Survey, Illinois.
- Lloyd Library, Cincinnati.
- Wisconsin Academy of Arts, Science, and Letters, Madison.
- California Academy of Sciences.
- Cornell University, Ithaca, New York.
- University of Minnesota.
- University of California.
- Library of Congress, Washington.
- Field Museum of Natural History, Chicago.
- American Museum of Natural History, New York.
- Buffalo Society of Natural History.
- Boston Society of Natural History.
- American Philosophical Society, Philadelphia.
- American Geographical Society, New York.
- Smithsonian Institute, Washington.
- Carnegie Institute, Washington.
- United States Department of Agriculture, Washington.
- Oberlin College, Ohio.
- National Academy of Science, Washington.
- Rochester Academy of Sciences.
- Academy of Natural Sciences, Philadelphia.
- New York Academy of Science.
- Indiana Academy of Science.
- American Academy of Science and Arts, Boston.
- Institute of Biological Research, Baltimore.
- John Crerar Library, Chicago.
- Ohio Academy of Science, Columbus.
- Arnold Arboretum, Jamaica Plains.
- Michigan Academy of Arts, Science and Letters.
- University of Michigan.
- Minnesota Geological Survey.
- New York Zoological Society.
- Wistar Institute of Anatomy and Biology, Philadelphia.
- Portland Society of Natural History.
- San Diego Society of Natural History.
- Puget Sound Biological Station, Seattle.
- Missouri Botanic Gardens, St. Louis.
- University of Illinois, Urbana.
- State College of Washington, Pullman.
- Bureau of Standards, Washington.
- National Research Council, Washington.
- United States National Museum, Washington.
- Public Health Service, Washington.
- Peabody Museum of Natural History, Yale.
- University of California, Los Angeles, California.
- Bingham Oceanographic Collection.
- Museum of Comparative Zoology, Harvard.
- Western Society of Engineers, Chicago.
- Academy of Science of St. Louis.
- University of Kansas, Lawrence.
- Kansas Academy of Science, Lawrence.
- University of Iowa.
- Vanderbilt Marine Museum, Huntington.

List of Members.

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*Domin, Dr. K.	Czech University, Prague.
Gregory, Professor W. K.	Columbia University, New York.
*Skeats, Prof. E. W., D.Sc.	The University, Melbourne, Victoria.

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*Jones, Professor T. G. H., D.Sc., A.A.C.I.	Chemistry Department, The University, Brisbane.
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* Members who have contributed papers to the Society.

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*Lahey, F. N., D.Sc.	Department of Chemistry, University of Melbourne.
*Langdon, R. F. N., B.Agr.Sc. ..	The University, Brisbane.
*Lee, Professor D. H. K., M.Sc., M.B., Ch.M., D.T.M.	The University, Brisbane.
*Legg, J., D.V.Sc., M.R.C.V.S. ..	Animal Health Station, Yeerongpilly.
*Longman, H. A., F.L.S.	Queensland Museum, Brisbane.
Love, V. N.	85 Kintore avenue, Prospect, South Australia.
Lumb, Professor S. F., D.D.S., L.D.S.	The University, Brisbane.
Lynch, A. J., M.B., Ch.M.	413 Brunswick Street, Valley, Brisbane.
*Mackerras, Mrs. Ian, M.B.	Box 109, Canberra, A.C.T.
MacMahon, P. G.	Health Department, Brisbane.
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