THE ANNUAL REPORT

OF THE

QUEENSLAND PHILOSOPHICAL SOCIETY,

1877,

WITH

THE PRESIDENT'S ADDRESS.

BRISBANE:

BY AUTHORITY: JAMES C. BEAL, GOVERNMENT PRINTER, WILLIAM STREET.

1877.

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REPORT

PRESENTED TO THE MEMBERS BY THE COUNCIL OF THE QUEENSLAND PHILOSOPHICAL SOCIETY, AT THE ANNUAL MEETING HELD 25TH JANUARY, 1877.

In presenting their Report for 1876, the Council find some matter for congratulation of the members in the present state of the society.

The meeting for the annual election of officers was not held until the 7th of July last; consequently the present officers have held office for a period of only seven months.

During the last twelve months the number of members has been increased by the election of three ordinary members (Dr. Thompson, His Honor Mr. Justice Lilley, and Mr. M. Soilleux), and three honorary and corresponding members (Rev. Robt. Harley, John Cockle, Esq., and Comte de Castelnau), and decreased by the leaving of Mr. Harlin and death of Mr. Chas. Coxen.

The financial state of the Society will be seen by reference to the Treasurer's report, which shows:—Cash in Union Bank, £1 3s.; in Government Savings Bank, £96 14s. 6d.; and cash in hand, £6 10s. 1d.

The number of papers read has been very small, and it is a matter for regret that so little interest is taken in the Society, as is evinced by individual members not bringing forward either interesting papers for discussion, or any objects of interest which they may possess, for exhibition.

April 6th.—A paper by Mr. Geo. Bennett, on "The Mammalia of Australia."

August 4th.—A paper by Mr. Diggles on "Some New and Rare Specimens of Australian Birds."

October 6th.—A paper by Mr. Thorpe, entitled "A Plea for Meteorological Statistics."

Mr. Diggles' paper was a most valuable addition to our transactions, introducing, as he did, written descriptions of four birds new to naturalists, which he has named—

Poëphila atropygialis,
Acanthiza flavigaster,
Cuculus Brisbanensis, and
Lamprococcyx modesta.

Messrs. Staiger and Bancroft have also rendered help by exhibiting various interesting objects during the year.

The Council have to express their regret at the loss sustained in the death, during the year, of Chas. Coxen, Esq., Vice-President of the Society.

The Council have to announce that two interesting papers have been already promised for the present year, viz., one by Dr. Bancroft on "The Platypus and Echidnæ," and another by Mr. Diggles on "The necessity of securing Specimens of the *Fauna* and *Flora* of Australia and Oceanica," and express a hope that members will assist in making the meetings, during the present year, more instructive and interesting than hitherto.

The Society has drawn the attention of the Government to the necessity of an *official true* time for the colony, and suggested means for securing that object.

The library has been increased by the addition of the following works:—

"Short History of Natural Science"—*Buckley,*
"Climbing Plants"—*Darwin,*
"Forms of Water"—*Tyndall,*
"Conflict between Religion and Science,"
"Magnetism and Electricity;"

and by the following donations, all of which have been suitably acknowledged:—

"Minerals in New South Wales"—*Liversedge,*
"Rust in Sugar-cane in Queensland"—*Liversedge,*
"Results of Meteorological Observations made in New South Wales during 1874"—*H. C. Russell,*

"Monthly Meteorological Observations—Months March and May, 1876"—*Astronomical Observatory, Sydney*,

"Transactions and Proceedings of the Royal Society, New South Wales, 1875."

Several numbers of the "Monthly Record of Meteorological Observations in New South Wales" having been either mislaid here, or never having reached their destination, the Government Astronomer, Sydney (H. C. Russell, Esq.), has kindly supplied us with duplicate copies.

In conclusion, the Council would earnestly draw the Society's attention to our want of better accommodation, the present room being incommodious for meetings and not easy of access for members during the daytime; and also to the propriety of altering the time for holding the annual meeting from December to May or June.

(Signed)

A. C. GREGORY,
Vice-President.
WM. PETTIGREW,
Treasurer.
S. DIGGLES,
Curator.
K. T. STAIGER.
A. B. ANDREWS.
JAS. THORPE,
Secretary.

THE PRESIDENT'S ADDRESS.

The President, Sir James Cockle, M.A., F.R.S., Honorary Member of the Royal Society of New South Wales, etc., delivered the following address:—

1. I return my best thanks to the Society for long continued indulgence. To have been called upon for so many years to preside over it, is an honor of which I may well be proud; associated, too, as I have been with one whose attainments and zeal, coupled as they were with modesty and suavity, will not soon be forgotten here. The loss of our Vice-President, Charles Coxen, leaves us regrets. The recollection of a conversation in which he took part leads me to mention now a matter which I have long intended to bring before the Society.

2. In a letter, dated Toowoomba, 19th September, 1867, I was asked to peruse a work in manuscript. I did so, and felt so much interested that I perused it again, and, shortly after, had it returned by post to its author. About that time I was much occupied, and by some mischance I did not write to the sender, to whom I have no further clue than the address, Toowoomba, and a statement in the letter that his business was that of a station superintendent. The high opinion which I formed of the merits of his paper will, I hope, be a sufficient excuse for this mention of his name, and I venture to invite Mr. William Haig Philp to send any communication of a scientific nature that he may have ready, to the Secretary of this Society, and to assure him that it will meet with due consideration. I did not feel competent to take upon myself the responsibility of advising him with respect to the publication of his paper, because it dealt to some extent with phrenology, a subject with which I am not familiar. It dealt, however, with other matters, and ably too, and I should be glad to hear that he had forwarded a paper to our Secretary.

3. I have also unduly delayed bringing another matter before the Society. On the 30th of April, 1866, I read a paper, printed in the *Queensland Guardian*, May 9th, 1866, "On the Fundamental Principles of Hydrostatics." Of this paper, I sent a copy to one of our leading scientific authorities, Mr. William Walton, on a portion of whose researches I had taken the liberty of commenting. He replied, by a letter dated Trinity College, Cambridge, August 25, 1866. The Society will be glad to hear his opinion on a question so interesting as that of the constitution of matter; and I have but little doubt of obtaining Mr. Walton's pardon for giving here the following extract from his letter:—

"In the article which I wrote on the Hydrostatical Shell, I "was, as you suppose, assuming the perfect continuity of fluids; "an hypothesis which may, no doubt, be erroneous."

"The question of discrete molecules is a perplexing one; I "mean rather the question whether fluid is to be supposed to "consist of discrete molecules, or to be continuous. In a "lecture (The Reade Lecture), delivered last May by Professor "Thomson, of Glasgow, before the University of Cambridge, he "spoke earnestly against the idea prevalent among chemists, "of the existence of indivisible molecules. This opinion would, "therefore, favor the *possibility* at least of fluid being really "continuous."

"If we assume the doctrine of discrete molecules, suppose "them for instance to be spherical. Imagine them to be en- "closed as in the diagram* in a 'rectangular' vessel, the centres "of the spheres lying in vertical lines. Now, the lateral pres- "sure is arbitrary, depending upon the squeezing AB towards "CD. The vertical pressure on BD is definite. This concep- "tion would show the possibility, in unstable equilibrium, that "pressure need not at a point of a fluid be equal in all directions. "Of course the experiment could not be performed in unstable "equilibrium; in stable equilibrium, where we can perform "experiments, the fundamental principle of fluid pressure "cannot be doubted."

This extract, and my paper, treat only of ordinary hydrostatics and have no reference to the kinetic theory of gases. How correct is the scientific attitude taken by Mr. Walton the controversy now or lately going on among chemists, respecting the legitimacy of the atomic hypothesis, may show. And, if I mistake not, this attitude is further justified by a question which has recently arisen respecting the constitution of the æther† of space. If Mr. Walton's views have undergone any modification, I must take the whole blame for having exhibited them in their unmodified form. One remark arises out of the above extract. Mr. Walton had elsewhere suggested that a slight jar to a spherical system in unstable equilibrium might, without disturbing the geometry of the fluid, transform the internal forces from a system of instability to one of stability, and place the internal pressure at each point in its orthodox state. In the case of "rectangular" unstable equilibrium, a slight jar might disturb the geometry of the fluid.‡

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* The diagram is easily drawn. BD represents the horizontal base and BA and DC, drawn upwards, the vertical sides. Within the figure, left open at the top, are twenty equal circles lying in five horizontal rows of four. The diameter of each circle is one-fourth of BD.

† Following Professor Joseph Bayma (see the footnote at p. 173 of his Elements of Molecular Mechanics, 1866,) I write *æther* to make a distinction between the luminiferous æther, or the æther of space, and the *ethers* of chemistry. Professor Challis had, at least as early as January, 1861, used the spelling *æther* in reference to the æther of space.

‡ If we take two or more sets of spheres, all those of one set being equal to one another and unequal to any sphere of another set, then the relative magnitudes may be so adjusted as that a slight jar to a system in 'rectangular' equilibrium shall give rise to arrangements which, under certain conditions, shall be definite and stable.

4. The doctrine of evolution has its attractions, not only for those who feel an interest in the labors of the naturalist and the physiologist, but also for those engaged in psychological studies. And, within the last twenty years, a theory of the evolution of mind has gained considerable currency. To say that the state of the mind and that of the body are mutually symbolic might seem to be going too far; for there are bodily processes of which we are unconscious, and, in speaking of mind, we generally mean conscious mind. Let us, for the present, however, accept the proposition that the state of the mind and that of the brain are mutually symbolic, including, if necessary, in the word "brain" all parts of the body essential to constitute the state symbolized in the mental state. Now, even if a state of the brain were exactly known, if the position and motion of each of its particles and the physical influences to which each was subject were rigorously determined, and if the corresponding mental state were known with the like accuracy, we still could say no more than that each state was a symbol of the other, and we should be as far as ever from knowing what mind in itself is, or how its manifestations are connected with those of matter. Understanding by 'similar' precisely similar, and speaking of course of living organisms, suppose that it were possible to find two brains which, as well as their corresponding bodies, should be, at a given instant, under similar external conditions and in similar states, such state in one case being, and in the other case not being, accompanied by consciousness; would the consecutive state of the two brains and bodies be similar? I conceive that, in order to justify the assumption that the relation between cerebral and mental states, is, for us, simply a symbolic one,—it is not necessary to answer this question; and, that whether we answer it in the affirmative or the negative, the assumption may be justified. If we say that the consecutive states would be similar, no question arises. If it be objected, that the consecutive states would not be similar, the objection implies that the superaddition of consciousness to life introduces a new physical or natural force into the bodily system. For brevity, and without any reference to the supposed cause of certain alleged manifestations which have been termed spiritualistic, call this hypothetical new force, psychical force, or psychism. Concede the existence of psychism, and even that, if difficulties about energy arose, they might perhaps be explained by some such theory as one which should suppose psychism to act at a distance with a force depending on its velocity, and therefore not subject to the law of conservation of energy. Still, the chasm which exists in thought between matter and mind would not be bridged over. If the consecutive state of the unconscious machine could be determined from the postulated conditions, so, too, could that of the machine to which consciousness was superadded; the only difference being that, in determining the consecutive state of the latter, we should have to consider the effect of a new natural force, possibly not differing more from the old

forces than the latter differ from each other. As a complete written history of events may be regarded as a representation of them by symbols, arbitrary and not contemporaneous with the events, so we may regard simultaneous cerebral and mental states as symbols, though not arbitrary, each of the other. To ascertain what cerebral state corresponds with a given mental state is in general an insoluble problem. But in some cases we may obtain an approximate solution. External events which affect consciousness may be said to be recorded in bilingual inscriptions, one part of the record being inscribed on the mind and the other on the brain. And the bilingual character of the inscription is favorable to interpretation. Thus, the burning the finger is recorded bilingually. It is inscribed on the mind in the form of a sensation of pain, and on the brain in that of a change wrought by a material disturbance propagated thereto from the finger. If we could ascertain the cerebral states, corresponding to the mental states before and after the feeling of pain, we could interpret the physical change in the language of mental change. Such interpretations, however, must probably be limited in number and variety, and, at all events, it would seem vain to anticipate that a knowledge of the laws of mind can be obtained by an exclusive study of the phenomena of the living body. The material and the mental phenomena must be studied separately, and physiology, though it may aid, will not supersede psychology. A theory of the evolution of mind cannot be estimated in the same way by those who differ from, and those who agree with, the psychological, physical, or metaphysical views of its author. And some acquaintance with the science of mind is necessary to those who approach the subject. But uncontested principles of the science are not easily to be found, or, at all events, the books are discordant. Excluding all that relates to the emotions, and much other matter, how can we obtain something like trustworthy information respecting the constitution of the intellect? Without going too deeply into metaphysical questions, which, though they have interested me for between thirty and forty years, may not have the same interest for all, I think we may obtain it thus: by seeing what views of the structure of the mind were taken by a man of recognised genius, who, without marked predilection for any particular metaphysical system, met with acknowledged success in his investigation of the operations of the understanding. Such a man was Boole, who, otherwise famous in the world of science, gave a new form and a wider scope to the science of logic. He notices that such questions as the existence of a sustaining ground of phenomena, the reality of cause, and others of a like nature, may possess a deep interest and significance in relation to science, without being essentially scientific; and that they who believe, and they who refuse to believe, that there is more in the relation of cause to effect than an unvarying order of succession, agree in their interpretation of the conclusions of physical astronomy. He asserts that, if the laws which he discusses are really deduced

from observation, they have a real existence and practical application as laws of the human mind, independently of any metaphysical theory, or of the truth or falsehood of any metaphysical speculations whatever. Let it even be granted that the mind is but a succession of states of consciousness, a series of fleeting impressions uncaused from without or from within, emerging out of nothing and returning into nothing again—still, as laws of succession, or, at least, of a past succession, the results to which observation had led would remain true. They would require to be interpreted into a language from whose vocabulary all such terms as cause and effect, operation and subject, substance and attribute, had been banished; but they would still be valid as scientific truths, * and valid alike for the idealist and the sceptic. They are valid, whether the senses actually present external objects to the understanding, or whether they merely represent to the understanding, as present external objects, what are, in reality, only modifications of the mind itself.

5. According to Boole there exist in our nature faculties which enable us to ascend from the particular facts of experience to the general propositions which form the basis of science; as well as faculties whose office it is to deduce from general propositions accepted as true the particular conclusions which they involve. The phrase instinctive belief in the permanence of sequences or, shortly, belief in uniformity, may serve to recall to our notice the former faculties, while the word understanding may be taken to include the latter, namely, the logical, faculties. The above faculties are subject in their operations to laws capable of precise scientific expression, but invested with an authority which, as contrasted with the authority of the laws of nature, is distinct, *sui generis*, and underived. Further, there is a fitness between this mental procedure and the conditions of our environment—viz, such conditions as the existence of species connected by general resemblances, of facts associated under general laws; together with the union of permanency with order. Were this correspondence between the forms of thought and the actual constitution of nature proved to exist, whatsoever connection or relation it might be supposed to establish between the two systems, it would in no degree affect the question of their mutual independence. It would in no sense lead to the consequence that the one system is the *product* of the other.

6. These faculties operate on the subject-matter of knowledge. That subject-matter is obtained through other faculties. Certain objects are presented to us, or represented as present, by our Senses; others again are represented before us by our Memory or Imagination. But what are we to say of space and time? Boole observes that we have no warrant for resolving

* "An Investigation of the Laws of Thought," &c., by George Boole, London, 1854. See chap. iii., arts. 1 and 2., p.p. 39 to 41. In verification of the next four paragraphs of this address see Boole, chap. xxii., art. 9, p. 420, and art. 8, p. 418; next, see art. 5, p.p. 404 to 406; next, see art. 8, p.p. 418 and 419.

these into mere forms of the understanding, though they unquestionably determine the present sphere of our knowledge, and that whenever different hypotheses are equally consistent with an observed fact, the instinctive testimony of consciousness as to their relative value must be allowed to possess *authority*. If space and time be regarded as presented to us by a special faculty, I shall call such faculty the Intellect. In that case I should say that we have two descriptions of presentative or representative faculties—viz., the senses and the intellect.

7. According to Boole, besides the general propositions which are derived by induction from the collated facts of experience, there exist others belonging to the domain of what is called *necessary* truth. Such are the general propositions of arithmetic, as well as those expressing the laws of thought, which are capable of rigorous verification in, and are manifested in all their generality from, the study of particular instances. Again, there are general propositions expressive of necessary truths, but incapable, from the imperfection of the senses, of exact verification. Some, if not all, of the propositions of geometry are of this nature; but it is not in that region alone that they are found. It has been maintained that propositions of this class exist in the mind independently of experience, and that those conceptions which are the subject of them are the imprints of eternal archetypes. With such archetypes, conceived to possess a reality of which all the objects of sense are but a faint shadow or dim suggestion, Plato furnished his ideal world. It has, on the other hand, been variously contended that the subjects of such propositions are copies of individual objects of experience; that they are mere names; that they are individual objects of experience themselves; and that the propositions which relate to them are, on account of the imperfection of those objects, but partially true; lastly, that they are intellectual products formed by abstraction from the sensible perceptions of individual things, but so formed as to become, what those things never can be, subjects of science, *i.e.*, subjects concerning which exact and general propositions may be affirmed. And there exist, perhaps, yet other views, in some of which the sensible, in others the intellectual, or ideal, element predominates. In Boole's view neither do individual objects, nor, probably, do the mental images which they suggest possess any strict claim to the title of objects of science, objects in relation to which all its propositions are true without any admixture of error. He thought, nevertheless, that such conceptions, however imperfect, do point to something beyond themselves, in the gradual approach towards which all imperfection tends to disappear; but that we can only affirm that the more external objects do approach in reality, or the conceptions of fancy by abstraction, to certain *limiting* states, never, it may be, actually attained, the more do the general propositions approach to absolute truth.

8. If the study of the laws of thought avails us neither to determine the actual constitution of things, nor to explain its perplexities, still less, according to Boole, does it enable us to rise above the present conditions of our being, or lend its sanction to the doctrine which affirms the possibility of an *intuitive* knowledge of the infinite, and the unconditioned, whether such knowledge be sought for in the realm of nature, or above that realm. We can never be said to *comprehend* that which is represented to thought as the limit of an indefinite process of abstraction. A progression *ad infinitum* is impossible to finite powers. But though we cannot comprehend the infinite, there may be even scientific grounds for believing that human nature is constituted in some relation to the infinite. We cannot perfectly express the laws of thought, or establish in the most general sense the methods of which they form the basis without at least the implication of elements which ordinary language expresses by the terms "Universe" and "Eternity." As in the pure abstractions of Geometry, so in the domain of Logic it is seen, that the empire of Truth is, in a certain sense, larger than that of Imagination. Thus the theory of the mental processes, as applied only to finite objects, seems to involve the recognition of a sphere of thought from which all limits are withdrawn.

9. I believe the foregoing to be a substantially correct representation of Boole's views on the constitution of those faculties of the mind which are exercised in science. He speaks of the confidence with which young children connect events whose association they have once perceived, and of their reference of every kind of sequence to that of cause and effect. He speaks of the uniformity of nature as pre-supposed in the theory of probability, and of the necessary sequence of states and conditions in the inorganic world.* I venture to make a distinction between understanding and intellect which is not made by Boole, who seems to use the words understanding intellect, and reason, interchangeably. By intellect, I mean the intellect proper, the noetic faculty, the source of the notions of space and time; and, if that source be held to be the exercise of the utmost possible degree of abstraction on things or events, then I should call such an exercise of the mind an exercise of intellect. With Hamilton, I use the term understanding for the dianoetic or discursive faculty, for the faculty of relations or comparison †; treating it as admitted, that language is an

* Boole, op. cit., p. 361, footnote. Since my last address, another illustration of the instinctive tendency to regard antecedent and subsequent as antecedent and consequent, or, as cause and effect, has come under my notice. A little girl disturbed at an unusual hour asked a question to this effect: "If I go to bed, when will it grow light again?" I forget whether day had dawned or not, and my only doubt is, whether the words sleep and dark ought not to be substituted for "bed" and "light" respectively. Next, see Boole, p.p. 14 and 407.

† "Discussions," &c., by Sir William Hamilton, Bart., second edition London, 1853. See p.p. 4, 7, and 13; see also p.p. 17 and 27.

instrument of human reason, and not merely a medium for the expression of thought.* The general result is this: The materials of knowledge are worked up into strictly scientific forms by the belief in uniformity and by the operations of the understanding. These operations—viz., the logical processes, considered in connection with other canons of belief, are used by Boole in his theory of probabilities.

10. In saying that space and time determine the present sphere of our knowledge, Boole may be taken to assign "the conditioned in space and time" as that sphere. But I think that he affords no support to the theory called "The Philosophy of the Conditioned." His remark that a progression *ad infinitum* is impossible to finite powers, does not fully disclose his views. On turning to a previous page (194) we find him observing that the "impossibility of infinite succession" has commonly been assumed as a fundamental principle of metaphysics, and extended to other questions than that of causation; that Aristotle applies it to establish the necessity of first principles of demonstration; of an end (the good) in human actions, &c.; that there is, perhaps, no principle more frequently referred to in his writings; that by the schoolmen it was similarly applied to prove the impossibility of an infinite subordination of genera and species, and hence the necessary existence of universals. Boole's remark on this seems to indicate that he was not satisfied with the principle. Apparently, he says, the impossibility of our forming a definite and complete conception of an infinite series, *i.e.*, of comprehending it as a *whole*, has been confounded with a logical inconsistency, or contradiction in the idea itself. The question of infinity must, I think, be left to mathematicians, and, fortunately, it has undergone a careful discussion at the hands of one who, like Boole, was famed in the scientific world, and who, in his † memoir "On Infinity," &c., has treated the subject critically, historically, and philosophically. Perhaps Boole and De Morgan substantially agreed even in their views as to the basis of geometry, for Boole (see p. 404 and compare p. 419) says, that although the perfect triangle, or square, or circle exists not in nature, eludes all our power of *representative* conception, and is presented to us in thought only, as the limit of an indefinite process of abstraction, yet by a wonderful faculty of the understanding, it may be made the subject of propositions which are *absolutely* true, and that the domain of reason is thus revealed to us as larger than that of imagination. Disputes about infinity seem to arise from a neglect to distinguish between imaged and unimaged concepts. De Morgan observes that all our senses have their images; we can image a cry of fire, and the inmates of the house rousing up in alarm.

* Boole, "Laws of Thought," chap. ii., art. 1, page 24.

† "On Infinity; and on the Sign of Equality," by Augustus de Morgan. Printed in the transactions of the Cambridge Philosophical Society, vol. xi. part 1.

But, though we can *conceive* their alarm, we cannot *image* it; by the depravation of a word we can *imagine* it. He says that it is not very easy to find in philosophical writings either admission or refusal of the distinction between imaged and unimaged concepts; there is occasionally what can only be construed as implied admission or implied refusal; and very often there is such confusion of phraseology as would lead to the supposition that the distinction is not seen. In his view there is subjective reality, both of the infinite and the infinitesimal. I have lately come across an important remark of Arago, which, as not occurring in a metaphysical work, will have the greater weight. Arago notices that the angle at which its tangent meets the circle is an infinitesimal angle. Now, this being so, we see that if matter be continuous, and if we had adequate tools, we could construct an infinitesimal angle. Thus we should have not merely an imaged, but an actually modelled infinitesimal. Here Arago confirms De Morgan. For if an infinitesimal may be an imaged concept, an infinite may be an intellectual concept, though unimaged. De Morgan says that by Hamilton the concept and the image were not distinguished. I am not so sure of this. I think that he saw* the distinction, but failed to see its full significance.

11. In Boole's opinion, a too great addiction to metaphysical speculation seems, in some instances, to have produced a tendency towards this species of illusion—viz., that, of the two systems of Thought and Nature, one is the mere product of the other. I hope not to be deemed presumptuous if I add that, even admitting that every physical question, probed to the bottom, opens into a metaphysical one, still the metaphysical exploration of physical ideas does not seem likely to lead to very important results In dealing with material phenomena, the physicist presumes the uniformity of nature and, for the rest, resorts to his observations or his calculations. When we say that such and such a thing possesses such and such a property we are, no doubt, impliedly saying that our expectation is that the presence of the thing, under such and such circumstances, will be followed by certain results. And so far, it may be said, a metaphysical element enters into physics. But it does not follow that the metaphysician is competent to give final opinions upon such questions as the indestructibility, or ultimate incompressibility of matter, or its geometrical or mechanical divisibility, or the laws of its motion, or whether its atoms, if such things be, are extended or unextended; whether, if they are small bodies, atoms are infinitesimally small, or whether they are geometrical points. Surely, on such questions the metaphysician can only transmit opinions which, if they be sound ones, he, must himself, have obtained from the chemist, or the physicist, or the geometer.

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* See Hamilton, Discussions, p. 13 (in his footnotes).

12. Recurring to Boole, we find him (at p.p. 417–418) saying that it may be that the progress of natural knowledge tends towards the recognition of some central Unity in Nature. Of such unity as consists in the mutual relation of the parts of a system there can be little doubt, and able men have speculated, not without grounds, on a more intimate correlation of physical forces than the mere idea of a system would lead us to conjecture. Further, it may be that in the bosom of that supposed unity are involved some general principles of division and reunion, the sources, under the Supreme Will, of much of the *related* variety of Nature. The instance of sex and polarity have been adduced in support of such a view. As a supposition, continues Boole, it is not very improbable that, in some such way as this, the constitution of things without may correspond to that of the mind within. But such correspondence, he says, if it shall ever be proved to exist, will appear as the last induction from human knowledge, not as the first principle of scientific inquiry; adding, that the natural order of discovery is from the particular to the universal, and that it may confidently be affirmed that we have not yet advanced sufficiently far on this track to enable us to determine what are the ultimate forms into which all the special differences of Nature shall merge, and from which they shall receive their explanation.

13. I think that the last remark deserves serious attention even now, and that the progress of what is called Philosophy has not, during the last twenty or more years, been so marked as that of Science. The authority of consciousness was not more fully recognised by Boole than by Aristotle, in whose philosophy the presumption in its favour obtained the authority of a principle. "What *appears to all*," says Aristotle, "that we affirm *to be*, and he who rejects this *belief*, will, assuredly, advance nothing better worthy of credit." And "If we know and believe," says Aristotle, "through certain original principles, we must know and believe these with *paramount certainty*, for the very reason that we know and believe all else through them;"* and he elsewhere observes, that our approbation is often rather to be accorded to what is revealed by nature as actual, than to what can be demonstrated by philosophy as possible. It may be remarked, says Brown,† of the demonstrations of reasoning that, in addition to the general principle that determines to the belief of the agreement of the separate propositions, there is always some primary proposition, of which the truth is as much assumed as that of causation, which serves as the basis of the propositions that follow; and without the assumption of the truth of which, as independent of the argument that follows it, there must either be an infinite series of propositions, or no belief whatever.

* See Hamilton, Discussions, p. 90. The italics in the above quotations are his.

† Brown, Inquiry into the Relation of Cause and Effect, third edition, 1818, p. 475.

14. I conclude with some observations of Boole. Were it said, he observes,* that there is a tendency in the human mind to rise in contemplation from the particular towards the universal, from the finite towards the infinite, and from the transient towards the eternal; and that this tendency suggests to us, with high probability, the existence of more than sense perceives or understanding comprehends, the statement might be true for a large number of minds. There is, however, a class of speculations, the character of which must be explained in part by reference to other causes, impatience of probable or limited knowledge, so often all that we can really attain to; a desire for absolute certainty where intimations sufficient to mark out before us the path of duty, but not to satisfy the demands of the speculative intellect, have alone been granted to us; perhaps, too, dissatisfaction with the present scene of things. With the undue predominance of these motives, the more sober procedure of analogy and probable induction falls into neglect. Yet the latter is, beyond all question, the course most adapted to our present condition. To infer the existence of an intelligent cause from the teeming evidence of surrounding design, to rise to the conception of a moral Governor of the world, from the study of the constitution and the moral provisions of our own nature; these, though but the feeble steps of an understanding limited in its faculties and its materials of knowledge, are of more avail than the ambitious attempt to arrive at a certainty unattainable on the ground of natural religion. And as these (Boole goes on to say) were the most ancient, so they are still the most solid foundations, Revelation being set apart, of the belief that the course of this world is not abandoned to chance and inexorable fate.

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* Boole, Laws of Thought, p.p. 217, 218.

By Authority: J. C. Beal, Government Printer, William ftreet, Brisbane.

ON SOME AUSTRALIAN BIRDS.

PAPERS READ BEFORE THE QUEENSLAND PHILOSOPHICAL SOCIETY,

BY

SILVESTER DIGGLES, ESQ.

PAPER I.

(*6th November*, 1873.)

Mr. J. T. Cockerell, since his return from the North, has been kind enough to place in my hands two new and interesting birds, for the purpose of having them figured and described. The first is raptorial, and, I think, might with propriety be referred to some other genus* than any at present described as Australian; but as there is a great difficulty in arriving at a satisfactory conclusion, in consequence of our not possessing a museum containing examples from other countries, or even such an excellent book of reference as Gray's Genera of Birds, a copy of which I saw in the Museum at Sydney, I think it prudent to refer the present species to the genus *Milvus*, of which we have two—viz., *M. affinis* and *M. isurus*. In the latter species the wings are $4\frac{1}{2}$ inches, and in the former only 1 inch longer than in the present species, which I propose to call *M. striatus*. As you will perceive from a comparison of the two drawings of *M. isurus* and *M. striatus* before you, the striated crest and breast are very similar in the style of their markings, and the tail banded in the same manner. In *M. affinis* this member is decidedly forked.

In every other respect but in the length of the wings, the proportions of the measurements are very much alike, and agree better than with any other species of Australian raptorial. The bill is moderately long and considerably hooked, scarcely so narrow as in *isurus*, nostril oblique, the cutting edge of the upper mandible slightly waved, skin round the eye nearly naked, and dotted with minute feathers; wings and tail long, the tips of the former when closed being shorter than the latter by $3\frac{1}{4}$ inches. The 4th, 5th, and 6th primaries are the longest, exceeding the first by 4 inches. The tarsus is feathered in front to half its length, feet rather small, the two lateral toes and the hind one (excluding the claws) are equal in length, the middle toe longer than the others, and with a claw measuring $\frac{3}{4}$ inch round the curve; the claw of the outer toe much smaller, and those of the inner and hinder toes, about equal in size, and larger than the others.

* It is very similar in its characters to the Brazilian genus *Cymindis*.

The following description is taken from my notes :—"Head, cheeks, and back of the neck light buff, each feather (but especially on the crest) broadly and boldly striated with brownish black. Back wings and tail, deep vinous gray, each feather broadly banded with black; the tail has six bands; chest and under surface light buff, the former well marked by bold wedge-shaped black streaks, and the latter with lines of the same color all in the centre of each feather; under surface of tail light gray, banded with darker gray. The quills are black both in the primaries and tail where the dark bands cross, and white at the lighter parts. The bill is bluish-white, blackish on the culmen and tip. Cere and feet yellow. Iris (?); length, 21 inches; wing, 14½; tail, 11; bill, 1⅜; tarsus, 2. Shot by Mr. Cockerell in April of the present year, in Whitsunday Passage, about latitude 20 degs. 30 mins. Two were seen but only one secured."

I have also the pleasure of bringing before your notice a large and beautiful rail, which is certainly new, at least to the fauna of Australia. I shall provisionally refer it to Mr. Gould's genus *Eulabeornis*, which it much resembles in form, the principal difference being that the *E. castaneoventris* of Gould has a longer tail than the present species, which I propose to call *E. griseoventris*. I was aware of the existence of this species before from a sketch taken by Mr. Bishop when with Mr. Daintree, the geologist, from a skin which unfortunately was lost. Mr. Cockerell has been more fortunate with his specimens, the *habitats* he has given me being Cape York and Thirsty Sound. It runs with amazing swiftness, and that is all the imformation I have about it.

The description in my notes is as follows :—"Head, neck, upper part of back and chest, deep chestnut; wings and middle of the back, olive brown; primaries, light chestnut; lower portion of back and tail, deep black; abdomen, dark grey; vent and under tail coverts, black; feathers of the flanks and under surface of shoulder, black, broadly tipped with white; throat, whitish, barred with chestnut; bill, greenish yellow, darkest at the base, and lighter at the tip; iris, bright scarlet; bare space round the eye, also scarlet; legs and feet, vermillion; length, 15½ inches; wing, 7½; tail, 2½; bill, 2⅛; tarsus, 2½; mid toe 1⅞."

The drawings of the two species will, I think, sufficiently show their relationship. That of *E. castaneoventris* is from a specimen kindly lent me by Mr. F. G. Waterhouse, of the Institute Museum, Adelaide; and which he received from the Northern Territory, near Port Darwin.

This paper was originally printed in the Brisbane *Courier*.

Paper II.

HABITS OF MENURA ALBERTI AND A DESCRIPTION OF FOUR NEW AUSTRALIAN BIRDS.

Paper read by Mr. S. Diggles before the Queensland Philosophical Society, 29th January, 1874.

It is well known to the members of this society that in consequence of the crisis which took place in the commercial world about seven years ago, I was compelled to discontinue the work on which I was then engaged, entitled, "The Ornithology of Australia." The list of subscribers to that publication fell almost suddenly from 90 to 60, and rendered the bringing it out a matter of such serious responsibility that I was forced to discontinue it, until circumstances should arise favorable to its resumption. I have been in hopes that some one would be found willing to assist me in completing the work, which had been favorably received by the subscribers generally, and regretfully discontinued by so many in consequence of the circumstances to which I have alluded. But as yet no one has come forward having the necessary means at command to enable me to complete a work for which I have ample materials in my possession, having since that period been adding from all available sources information (including drawings) concerning Australian birds, some of which are new to us. Works of such magnitude and importance are not generally undertaken by private individuals. The Governments of different countries in Europe have not considered it beneath their dignity to assist authors to bring out some of the first works on natural history which have yet appeared. From the large amount of skilled drawing and artistic colouring required in the illustration of such works and without which indeed they would be almost useless, they are seldom undertaken without such help as that to which I have referred. As time progresses I see little immediate hope of a change, so far as bringing out or continuing the work in this country is concerned, and the greater is the pity, since by my own unaided efforts one third of the estimated amount was actually accomplished, and it remains to be seen whether those now at the head of affairs in Queensland will consider themselves justified in giving a helping hand towards its completion. But I have perhaps dwelt too much on this topic, which, though of personal interest, will, I am sure, meet with your kind consideration, and I will now proceed to detail certain facts which have come to my knowledge, and which, if proved to be true, will be of much interest to the naturalist. A good deal remains to be known concerning our species of Lyre Bird or "Menura Alberti," and all information concerning the habits and economy of so interesting a bird must be gladly hailed from any quarter, more especially if it should be found to indicate in a clearer manner than hitherto the particular relationship of the Menura with other birds supposed to be far removed from it. The assertion of the late Mr. Rawnsley that the Lyre Bird is nearly related to the family of the Wrens (Maluri), &c, of which it is the most gigantic species,

does not I think very naturally commend itself to the judgment of any one, and it is only by considering the peculiarities which truly do in some manner simulate certain characteristics of the Wrens that the analogy or supposed relationship has any force. But while due weight is given to the facts which appear to bring Menura and Malurus in juxtaposition, we must not forget that there are other and perhaps far weightier reasons for removing both Menura and several other birds—as Orthonyx, and perhaps Psophodes—from their present location. The very aspect of Menura is gallinaceous. Take away the long flowing plumes of the tail and what have we? Why little else than a barn-door fowl; and certainly as closely assimilating to that bird as the Tallegalla, Leipoa, or the Megapodius. The most striking and peculiar function which I would attach to the mound-making birds and Menura, is that of scratching; and we know that the M. Superba, as described in Mr. Rawnsley's interesting paper, will readily tear to pieces with its powerful feet the rotten trunk of a fallen tree in persuit of its food—centipedes and insects. But if it should be hereafter proved that the Menura itself—or, at least, the Queensland species—actually makes a mound, the reason for uniting the Lyre Birds and the Mound Builders will be greatly strengthened; and the particular habit of them all in seeking for their food after the manner of the Gallinaceæ, by scratching, will be sufficiently suggestive to the thoughtful naturalist. I will now relate some information which I have lately had brought to my notice by Mr. J. T. Cockerell, and which I truly hope our Vice-President (Mr. Coxen) will have in his power to verify on some favorable occasion shortly when he visits that neighborhood.

Early in December, Mr. Cockerell went to the Coomera Ranges for the purpose of procuring specimens of Menura Alberti. He was informed by some sawyers, and especially by a Mr. Arthur Binstead, that three Lyre Birds were feeding near the spot where they were working. He went to the place, but the birds were too wary for him, and he was only able to hear their whistle as they took their departure. He examined the spot where they had been, and perceived the ground scratched about in all directions, and a small quantity of dirt and leaves heaped together. On a subsequent visit he was equally unsuccessful, but a week or more afterwards he succeeded in shooting a male at the spot where he had seen the heap of dirt and leaves, but which he found was much larger than before, and looked like the mound of a Tallegalla, but not so large, and differing in having no sticks in its composition, like the mound of the brush turkey, or Tallegalla. It was a much neater structure altogether. Some aboriginals, as well as the individuals before alluded to, confirmed Mr. Cockerell's suspicions, and asserted positively that the mound was doubtless the workmanship of the bird which he had shot—a fact which had been long known to them; that the eggs were three in number, and were deposited at a depth of a foot or so, were cream colored spotted with brown, and not so large as those of the turkey, as they call it. They informed Mr. Cockerell that the habit of the

birds was to make a tunnel right through the mound, so that the young might make their exit at either side. The mound is frequently resorted to by the young birds, and Mr. Binstead, assisted by some sawyers, some time ago, watched their opportunity and captured four after they had entered the mound. Mr. Binstead took them home and reared them without difficulty. They were hardy, and fed about like common chickens, but were unfortunately burnt some time afterwards in a bush fire. As there is no truly gallinaceous bird indigenous to Australia, I think we may with propriety suppose that the Megapodes and perhaps Menura are their proper representatives, and very probably, as with many other members of the Australian Fauna, will prove to be of a very ancient type, as their mode of incubation, like that of the gestation of the Marsupialia, is so unlike the habits and customs of animals in modern times. If the great difference of appearance between the Tallegalla and its congeners, and the Menura, is urged, particularly as regards the tail, let it be well remembered that the Gallinaceæ are of all birds the most diversified. Some have short and some, like the peacock, very long tails, but all are scratchers. Many most interesting examples might be adduced which will occur to thoughtful minds.

My next duty is a pleasing one, and shows that we have by no means exhausted our list of Australian birds. I have now the pleasure of exhibiting some drawings I have only lately completed of two new bitterns and two new kingfishers. The former you will perceive are on a reduced scale, and the latter the size of life. I can say very little about them, my remarks being almost entirely descriptive. The first I have called Ardetta Nigra, or the black bittern. The head, neck, back, upper portion of the wings, and the tail are greyish black, primaries and secondaries grey, lightest on the outer webs; under surface dark blackish grey, tinged with brown; legs and feet black; bill black, with a streak of yellowish horn color on the under mandible; eyes yellow, cere greenish yellow.

Length 21¼ inches; wing 8¼, tail 3, tarsus 2½, bill 3¾. This specimen was shot in a swampy region full of reeds and aquatic vegetation, between the Jardine and Kennedy rivers, about thirty miles from Cape York. It was brought to Mr. Cockerell from thence by the blacks, whom he found of great use and assistance in making his valuable collection; and here I would again thank him for the opportunity he has offered me of describing and figuring this and the three following birds:—

The next is a beautiful bittern—perhaps the most beautiful among the Australian species—and it is with great pleasure that I dedicate it (supposing it to be new to science) to Mr. J. T. Cockerell, under the name of Ardetta Cockerelli or Cockerell's bittern. The description is as follows:—

Forehead and crown black; chin, throat, abdomen, under surface and edge of shoulder, and lower part of the back, delicate, light buff. The remainder of the visible plumage, including the tail, closely and

finely barred alternately with buff and black. The primaries are light grey underneath, dark grey on the upper surface, and on the outer webs the bars assume the form of spots on the external feather, these marks becoming irregular and broken as they approach the secondaries. The inner webs of the primaries are curiously mottled, yet more or less preserving the character of bars, and form great diversity of pattern, no two feathers being alike. The lengthened coverts and scapulars so overlap the wings as to hide them completely when closed. The bill is dark brown in colour, blackish along the culmen and lighter at the tip. The under mandible is lighter brown in color, and blackish along the biting part. Eyes and feet yellow. Length 25 inches; wing $11\frac{1}{2}$, tail 5, bill $4\frac{1}{4}$, tarsus $3\frac{1}{4}$. This bird was shot at the same time and place as the preceding.

We have hitherto been acquainted with only one species of minute kingfisher, viz., the Alcyone Pusilla, though the form is known to exist in the E. I. Archipelago, and it may be found that the two species I am about to mention may have been described under other names by Wallace and other naturalists. From the small distances that have to be traversed several beautiful kingfishers resort from New Guinea, and doubtless other islands, to our northern shores, and spend a more or less lengthened period there before returning, and possibly these may be among the number. But it is highly interesting to record as Australian such a lovely addition to its avifauna as Alcyone Bella, the "beautiful kingfisher," a description of which is as follows:—Forehead, ear coverts, and interrupted band on the chest, black; head, intense blackish blue, the centre of each feather on which is glossy and shining ultramarine blue; shoulder and primaries brownish black. The rest of the wing dark purplish blue, except the greater and lesser coverts, which have ultramarine glossings in the centre of each feather, like the feathers of the crown; lores, and a tuft behind the ear coverts, whitish buff; throat white; chest, abdomen, and under tail coverts, rich orange; centre of the back and upper tail coverts, bright shining cobalt blue; tail nearly black; irides and bill, black; feet, flesh color. Length, $5\frac{1}{8}$ inches; wing $2\frac{1}{4}$, tail $\frac{3}{4}$, bill $1\frac{5}{8}$, tarsus $\frac{1}{4}$.

Several specimens of this beautiful little creature were obtained about twelve miles from Cape York by Mr. Cockerell, who says it is seldom seen near water, its food consisting entirely of insects. It sits motionless on a twig, and making a dart at any passing insect secures it and returns to the same spot.

Alcyone Assimilis (allied kingfisher).—The specific name which I have applied to this species has reference to the similarity which exists between our A. Pusilla and itself, but the general dulness of color throughout, and the absence of the slightest tinge of green sufficiently distinguish it. Upper surface, deep purplish blue more or less mingled with blackish, especially on the wings; primaries and secondaries brownish black; lores, and the usual tuft behind the ear coverts, and the whole of the under surface, pure white. There is a purple band on each side of the chest, and the flanks are blackish

brown; bill and irides black. Length, 4⅝ inches; wing 2, tail ⅞, bill 1¼, tarsus ¼. This bird is found in the same locality as the preceding. Its habits are similar.

This paper was originally printed in the Brisbane *Telegraph*.

Paper III.

Short notice of two birds new to the Australian Fauna, read by Mr. Diggles, 28th May, 1874.

PTILONOPUS CHRYSOGASTER.

The natural habitat of this species is probably New Guinea. The specimen, of which my drawing is a representation, was shot by Mr. Cockerell, near Cape York. It much resembles P. Swainsoni both in size and coloration, the principal differences being the absence of the red or pink crown, and also the large portion of the under surface, which, in P. Swainsoni, is first black, followed by crimson and orange, the under tail coverts are also orange, whereas in P. Chrysogaster a central patch of orange alone exists. The chest is sparsely freckled, and the tips of the tail feathers are also greyish green, and not yellow as in Swainsoni. The drawings before you will sufficiently show these distinctions. I have also this opportunity of showing all the species of Ptilonopus at present known to Australia, and to correct an error which authors have fallen into in reference to the female of P. Superbus, which has been figured as a distinct species by Temminck, and named Cyaneo virens. These pigeons are nearly all of the same size, and doubtless assimilate in habit, the food being berries and small fruits. P. Ewingi, supposed by Mr. Gould, and figured by him as distinct, is only a variety of P. Swainsoni, and from numerous specimens of the latter which I have examined, I am perfectly satisfied as to the correctness of this conclusion.

NEW NECTARINEA.

So large a number of this beautiful genus having been described, and as the present drawing represents the only specimen that I am aware of having been obtained in Australia, I am unwilling to give a name to it, as in all probability it will be found already named, figured, and described in some of the great works. I have prepared the accompanying drawing for Mr. E. P. Ramsay, of Sydney, who has promised to find out from some of the works to which he has access whether or no such is the case; in the meantime I content myself with description and measurements. The family to which the bird belongs is known

under the name of Sun Birds, and fitly represent in our eastern hemisphere the humming birds of the western. Description: crown of the head, scapularies, the back and lateral tail feathers lustrous rifle green, chin and throat shining metallic purple, the rest of the plumage black, feet and bill black; size about 4 inches, wing $2\frac{3}{8}$, tail $\frac{7}{8}$, bill $\frac{3}{4}$, tarsus $\frac{1}{2}$ (estimated).

Two species are now known to Australia, and in all probability the new bird is a visitant probably from New Guinea. Many others are found in the E. I. Archipelago, India, &c., and from their great beauty are much sought after by collectors. Shot by Mr. Cockerell near Cape York.

James C. Beal, Government Printer, William street, Brisbane.

BOTANY IN SCHOOLS.

BY HERMANN SCHMIDT, ESQ.,

One of the Masters of the Brisbane Grammar School.

Paper read before the Queensland Philosophical Society, Thursday, 28th May, 1874.

It is a trite remark that the study of plants is highly interesting and useful in many respects. The medicinal treasures of the vegetable kingdom, for instance, are far from being exhausted. It is more than probable that a Queensland botanist will yet have the satisfaction of hearing that a plant discovered by him has been found to be a most valuable remedy against maladies hitherto considered next to incurable. It is very possible, too, that our Queensland forests shelter now, in their midst, plants unknown, yet highly valuable for their fibres, their dyeing properties, their gum, &c. A similar remark applies to the agricultural and pastoral value of many native grasses and herbs.

Various classes of people find peculiar charms in the study of plants, and look upon them each from their own point of view. The professional botanist, for instance, values the various species of plants in the same spirit as the artist values a fine original. To many a scientific botanist the practical utility of a plant is almost a secondary consideration. Other lovers of plants, again, wish to utilise the vegetable world, and thus to render direct services to their fellow men. And no one will doubt that the agricultural, the horticultural, and the forest botany, the cultivation of native species, the importation and acclimatisation of foreign ones, is of the utmost importance to the community at large.

The artist searches in the vegetable kingdom for variety of form and color, when he wishes to get at the very masterpieces of beauty and grandeur. He is guided by taste, not by philosophical or practical considerations.

The schoolmaster, again, should study and cultivate plants for several objects. His main purpose in doing so should be closely connected with his calling as a teacher of youth; yet he ought, if possible, to extend his botanical occupations, with the view of rendering them beneficial to the community in which he lives.

With reference to education, however, we must bear in mind that education and information are matters entirely different in their nature and their effect. Education tends to develop and to cultivate

the intellectual and moral powers. Information consists in the communication of facts, and appeals more to the retentive than to the digestive faculties of the mind. It is chiefly education, and next to it information, which the schoolmaster wishes to accomplish, and it is evident that education requires a method of teaching and handling a subject quite different from information. Supposing, now, that a teacher wishes to teach botany chiefly for the purpose of education, introducing at the same time as much valuable information as the minds of his pupils are able to assimilate, without interference with true education, it will be necessary for him to work out the most suitable method;—and that is just his most difficult problem. Now, as it will help us to form an approximate estimate of the great importance of the method question, I may refer to the opinion of a most competent authority in the matter of science teaching in schools, Mr. J. M. Wilson, science master at Rugby. "There are," says Mr. Wilson, "two different methods of teaching science: one the method of investigation, the other the method of authority. The first starts with the concrete and works up to the abstract; starts with facts and ends with laws; begins with the known and proceeds to the unknown. The second starts with what we call the principles of the science: announces laws and includes the facts under them—declares the unknown and applies it to the known. The first demands faith, the second criticism. Of the two the latter is easier, and the former by far the better." He then goes on to say, "Knowledge must precede science, for science is nothing else but systematised experience and knowledge. In its expreme application this principle is obvious enough. It would be absurd to teach boys classification from minerals, or the power of experimental science by an investigation into the organic bases, &c."

So much about method in general. Mr. Wilson then explains how that method is to be practically applied, as follows:—"It is the master's business to take up the knowledge that already exists, to systematise it and arrange it, to give it extension here and accuracy there; to connect scraps of knowledge that seem isolated; to point out where progress is stopped by ignorance of facts, and to show how to remedy ignorance. Unless this method of investigation is followed the teaching of science may degenerate into cramming." In another passage he thus describes a systematic method of teaching botany:—"Suppose, then, your class of thirty to forty boys before you, of ages from thirteen to sixteen, as they sit at their first botanical lesson: some, curious to know what is going to happen; some resigned to anything; some convinced that it is a folly. You hand round to each boy several specimens, say of the herb Robert, and taking one of the flowers you ask one of them to describe the parts of it. 'Some pink leaves,' is the reply. 'How many?'—'Five.' 'Any other parts?'—'Some little things inside.' 'Anything outside?'—'Some green leaves.' 'How many?'—'Five.' 'Very good! Now pull off the five green leaves outside, and lay them side by side, and examine the little things

inside. What do you find?'—'A lot of little stalks or things.' 'Pull them off and count them.' They find ten. Then show them the little dust-bags at the top, and finally the curiously constructed central column, and the carefully concealed seeds."

Mr. Wilson proposes then that the representatives of the most important families should be treated in the same way. Every pupil should be made to look carefully at the object he has before him, and to investigate personally into its peculiarities of form and structure. The representatives of the families should be given to them in an order based upon a plan judiciously worked out, and then, after a time, pupils would find out for themselves the key to a natural system of classification.

Mr. Wilson's method is evidently a purely educational one, and differs essentially from the plan adopted in most of our text-books, which are merely written to convey information. No doubt his method secures the best exercise of the faculty of observation, it leads the natural curiosity into a proper channel, and gives the pupil a taste for the beauty, the symmetry, and the order which are displayed in nature. The teacher, in following that method, secures all the benefit of the mental training, imparting to his pupils, at the same time, a great deal of useful information.

No satisfactory results, however, can be arrived at unless the master is in the position to distribute a sufficient quantity of suitable material; that is, he must be able to hand to each boy of his class at least one specimen of the plant that is the subject of his demonstration for the time being. To prove this, I refer again to the opinion of a recognised authority, Dr. Lindley. In the preface to his work on School Botany Dr. Lindley lays considerable stress upon the necessity of examining plants, and expresses himself as follows:—"There is no method so certain to accustom young persons to estimate correctly the differences between one plant and another, and it is presumed no one will think of teaching botany without an ample supply of fresh specimens, which he may distribute amongst his class for the purpose of being examined and studied at leisure. Indeed it is useless to study botany unless this provision is made for the acquisition of those habits of observation which render natural science so peculiarly useful as a branch of mental training." Elsewhere Dr. Lindley says:—"Proficiency in the art of describing plants is now, by almost common consent, amongst qualified examiners, regarded as one of the best tests of botanical knowledge, as it is most certainly the best of all guides to a sound practical knowledge of structure, and to accuracy of observation."

I may also mention that the late Professor Henslow employed a similar method in teaching botany, with eminent success, both in his class at the University of Cambridge and in his parish school at Hitcham. He even went a step farther, and introduced a system of filling up schedules, which, to make use of Professor Oliver's words in the preface to his excellent book on Elementary Botany, "were designed to

direct the attention of the pupil at once to the most important points of structure."

The opinions I have quoted will be acceptable to every thinking man, whether actually acquainted with the subject of botany or not; the more so, because they have emanated from the pens of competent authorities—the first named as a teacher of boys, the last named as botanists.

The great difficulty in the way of teaching botany in Queensland schools is the want of available material. There is no garden from which to obtain plants for examination in sufficient quantity. The teacher requires plants of simple structure, plain representatives of the most important families, particularly such as are referred to in Lindley's and Oliver's books. Such plants have simply to be grown in a garden just large enough to allow the cultivation of sixty to seventy families, each represented by one to three species. A space of nine square feet would suffice for the rearing of plants that would yield between forty to sixty twigs, each carrying a bud, a blossom, a fruit, and a few leaves. A walk through Bowen Park, through the Botanical Garden, and a perusal of our nurserymen's catalogues, will prove that all the material may be had on the spot. It only requires to be collected, localised, propagated, and handed to teachers resident in the country.

It is almost superfluous to say that there is hardly a community in Queensland that would not assist their schoolmaster in establishing and keeping a garden for that purpose, so long as the humble pretensions as to its extent were fully understood.

Botanical excursions are almost out of the question. 1st. Because the climate forbids us to take pupils for a day's walk in the manner in which it is done in Europe. Near Brisbane we should have to take pretty long walks to reach any plants, because the immediate neighborhood produces no vegetation suitable for botanical studies. 2ndly. Non-professional botanists cannot obtain the names of the native plants, because there is no herbarium which amateurs may consult, and I have no hesitation in saying that the Government would earn the warmest thanks of a considerable portion of the community by supplying that want at the earliest opportunity.

To give a general impulse to the tuition of botany in schools, schoolmasters ought to be assisted in obtaining—1st. The material, consisting of books, seeds, diagrams, lenses, knives, &c., at cost price. 2nd. The names of plants which they may collect in their respective localities. I therefore suggest that a society for the promotion of that special object be formed in Brisbane. An attempt to do so was made a few months ago, and a small sum of money realised through an entertainment is lodged in the Savings Bank as the nucleus of a fund. All that now remains to be done is to bring the matter before the Board of Education, and the Trustees of the Grammar Schools, for their approval, and, if possible, recommendation; and these having been obtained, to invite the co-operation of all interested in the

subject, particularly of the schoolmasters in the country. Thus the object of the society would not be confined to the assistance of the schoolmasters in introducing the study of botany into their schools; it would aim also at encouraging the study of the Queensland Flora. Schoolmasters are better fitted, and have more leisure, than ordinary business men and artisans, to go into forests and scrubs with the view of collecting plants, and I am sure a good many of them would welcome the assistance offered to them towards providing for themselves and their pupils a pleasant and useful recreation.

In conclusion, I cannot help expressing my great pleasure at seeing the first publication of an important part of the Queensland Flora—the Ferns—in the hands of the public; and I hope the author, Mr. F. M. Bailey, may be induced to publish other parts of the Queensland Flora, particularly a Flora of this locality, as, by doing so, he will help us to find much more suitable material for the tuition of elementary botany than ferns. The several articles on the Queensland Flora which have appeared in the *Queenslander* during the last few months give us a welcome proof that the interest in the native plants is increasing; and I hope that the author of those papers, at present unknown to me, may be regarded as a future assistant in the great work which is before us. I have also great pleasure in expressing my sincerest thanks to Mr. Hill for kindly supplying me with plants for my lessons in the Grammar School; and, finally, to those gentlemen who assisted me some time ago in the attempt to raise some money for the object of promoting the study of botany in the Queensland schools. In conclusion I may state that I shall be happy, at all times, to receive communications, and suggestions, from those interested in the subject.

James C. Beal, Government Printer, William street, Brisbane.

THE SANITARY CONDITION OF BRISBANE:

READ BY W. PETTIGREW, ESQUIRE,

AT THE

MONTHLY MEETING OF THE QUEENSLAND PHILOSOPHICAL SOCIETY, HELD 24TH DECEMBER, 1874.

SEVERAL papers have been read before this Society bearing on this subject, particularly those by the late C. Tiffin, Esquire, Colonial Architect, and W. Coote, Esquire. The latter says a good deal in favor of carrying offensive matter in the most efficient way to the river, there to accumulate and fill up its bed, which has already been done in several places, besides polluting the atmosphere. The other advocated and invented an earth-closet arrangement.

Lately an Act of our Legislature was passed dealing with this subject, and compelling the Municipal Council to elect a Local Board of Health. I was one of those so appointed, but, I suppose, making ourselves too efficient in the discharge of our duties, the Council requested the Government to take steps to allow them to put others in our place, and which has been complied with.

This, then, is a subject which has received, is receiving, and will receive, attention for a length of time to come.

When on that Board I had opportunities of observing the defects of the present Act of Parliament, to which I shall presently refer.

Mr. Tiffin in his paper says there are three kinds of filth—slops, ashes, and ordure. By "*The Health Act*" provision is made for ashes and ordure, but none for slops. Now, slops can become and are a great source of complaint in many places in the city. Several cases were brought before the Board of Health, but to these I will not refer. I will refer to one of long standing in Margaret street, and to which Mr. Berry, many years ago, repeatedly called the attention of the Corporation. The gutter has been partly stone pitched, but the nuisance still exists in a mitigated form. Another one in William street and Margaret street is caused from slops and water from near Mr. Carey's premises. In William street and down part of Margaret street where the gutter is kept clean there is not much offensive smell, but near the river where it runs more slowly the smells are sometimes very offensive.

Now, in these instances referred to, as also in those brought before the Board of Health, no fault could be found with the premises from which the offensive slops proceeded—yards clean, gutters bricked and cemented, or tile drained. I shall only refer further to the greatest cause of a nuisance I believe in Brisbane at the present time. It is the water flowing from the butchers' shops near to the Post Office. Let the Inspector go into these shops any time in the day or night and there will be nothing he can find fault with; yet water comes from these places and runs down the open gutter to Edward street, from thence under ground to Adelaide street open ditch, and there it gives off its offensive exhalations in abundance. To sensitive people it is often quite bad enough in Queen street. The getting rid of these nuisances is the object of this paper.

The plan I would propose is that no water be allowed to flow from off any person's premises, containing offensive matter.

Taking the butchers' shops first, I would stop any water flowing from off their premises at all. It might be asked, what would I have done with it? I would have them to put it into a cask or tank and have it carted out to the country. This might cost them two or three shillings more per day, but what is that to destroying other people's healths, as is done at present? They might also use dry earth, or charcoal, or carbolic acid, so as to avoid having bad smells about their premises.

With reference to slops, the more extensive evil, I would have every person to have them so purified by filtration before leaving their premises that the issuing water would never be offensive. This I have had done at my own house for over twelve years, so that the plan proposed is cheap, simple, and efficient.

The plan as carried out on my own place is as follows. About twenty years ago I had the strip of ground below my house trenched and a drain put in on the rock;—depth about three feet. About twelve years ago I had an addition made to the house, and had the kitchen altered, and then put in the distributing drain for carrying away the slops from the kitchen. This drain goes from the sink in the kitchen, a distance of about six feet, and then divides into two branches, and these go each a distance of about eighteen feet. They go on each side of the drain—that is, about three feet deep. The distributing drain is made of three-inch horse-shoe tiles resting on hardwood flooring boards. The bottom of the drain is about a foot below the surface. I think that nine or ten inches is deep enough. This drain has required to be cleaned about two or three times a year, and a man can do it in a forenoon. No smell can be detected about this drain, indeed its presence is not known, unless when it is filled and requires cleaning. The cleaning consists in opening up the drain, lifting up the tiles, and shovelling the sludge into a bucket, and removing it to a suitable place —the garden in my instance. The horse-shoe tiles are much prefer-

able to pipe tiles for this purpose, being so much more easily cleansed. As to the first cost of this to me, it might amount to fourteen shillings, this is not including the deep drain which was put in some eight years previously; and the expense of cleaning it is not above (10s.) ten shillings per year. Some time ago I had occasion to alter the course of this drain on its way to the river, and I went down into it and smelled it carefully and could detect no smell at all of an offensive nature. Water was running in it at the time, although slowly.

It has been stated that my place is exceptionally situated, that what is done there could not be done all over the city. Doubtless there are places in which this plan could not be so efficiently carried out, as, for instance, in houses situated at the lowest part of an allotment. But in nine houses out of every ten in the city, there would be no difficulty at all in carrying it out.

What would be required would be somewhat as follows:—A pipe-tile drain would be required up each natural watercourse, and placed, if possible, at least four feet below the surface. From these main-drains, subsidiary drains would have to be laid, having junctions to each allotment. From these junctions a two-inch pipe to be laid up to near each house, and at least three feet below the surface, if possible. About fifty feet of horse-shoe tiles to be laid on hardwood boards, about ten inches from the surface, and about four or five feet on each side of the deep drain. It might be desirable to lay more than one deep drain, and put the distributing drains between them—in fact, drain and irrigate the ground; but that is going beyond the scope of my present paper, although the benefit to be derived from that cannot for a moment be questioned.

These drains would have to be laid by persons specially appointed for that purpose, and proper plans kept of them; and it would have to be made an offence at law for anyone else to interfere with the deep drains. It strikes me that the cleaning of the shallow drains had best be done by these same parties, inasmuch as that it could be done so much cheaper, than by each party cleaning his own.

It might be objected to this system that the ground would eventually get saturated with ammonia or other offensive gasses. To obviate such it would be requisite to have trees planted near the drains. The health-giving properties of gum-trees seems now to be a recognised fact, so that making it compulsory to have such trees planted would be necessary. There is no reason why grape-vines should not also be planted and trained up the gum-trees, and I doubt not but that they would give a very good account of the ammonia in splendid bunches of grapes. These are mentioned, but all trees and plants absorbe ammonia with avidity.

The probable cost would be somewhat thus:—Average of main and subsidiary drain to each house, say 50 feet, and take six-inch pipe-tiles

as an average for these, for some would be larger and some smaller, 50 feet at 1s., £2 10s.; 50 feet of two-inch pipes, at £3 per thousand, 3s.; 50 feet of three-inch horse-shoe tiles at 6d. equal £1 5s.; and 50 feet run of hardwood boards, six-inch by one-inch, at 2½d. per square foot, 5s. 2d.; making a total for material of £4 3s. 2d. The laying of these down might cost from £1 to £2, according to circumstances. If a greater expenditure was incurred in putting down more distributing and collecting drains, as also in trenching the ground, it would be all to the benefit of the place, and would repay the cost.

A sink with a perforated copper plate in the bottom would be required, so as to prevent loose rough stuff going into the drain. That might cost about 10s. The total cost might be from £6 to £7.

This paper might properly stop here, but knowing of great complaints made against the earth-closet system, arising mainly from a deficient supply of dry earth—for in wet weather there is no dry earth to be had, and no one that I am aware of has any dry earth in store. In order to remedy this defect I would propose to carry the urine in a pipe into the distributing drain. Should any offensive smell arise from the pipe, a little diluted carbolic acid would correct it. This plan would do away with two-thirds or three-fourths of the required dry earth. Indeed, in moist weather, when dry earth is not to be had, by using a little extra earth no smell would arise.

A physician lately told me that Brisbane was in a healthy state; but be that as it may, I purposely went through Frogs' Hollow, one night, lately, and I was very glad, indeed, to get to my own house, to get rid of the sickening offensive smells. In that locality there is abundance of room for improvements such as sketched out in this paper. But nothing less than an Act of Parliament will be of any avail in making people keep their places in a clean and healthy state. Aldermen are unfit to become members of Boards of Health, because, if they do their duty efficiently, they will offend the majority of their constituents, and so will not be re-elected, and those who wish to retain their seats as aldermen will take care to leave things much as they are. It is only but right that the Municipal Council should have a say in the appointment of the Local Board of Health, as they have to find the funds to keep them going, but after their appointment the less they have to do with them the better for both parties. Limiting the selection to ex-aldermen who have served at least four years in the Council, there is no danger of any extravagance, and such men would know the city very well.

By Authority: James C. Beal, Government Printer, William street, Brisbane.

NOTES OF RAMBLES

IN

SEARCH OF FOSSIL REMAINS

ON

THE DARLING DOWNS.

BY

GEORGE F. BENNETT.

A Paper read before the Queensland Philosophical Society, 7th December, 1875.

BRISBANE:
BY AUTHORITY: JAMES C. BEAL, GOVERNMENT PRINTER, WILLIAM STREET.

1876.

NOTES OF RAMBLES IN SEARCH OF FOSSIL REMAINS ON THE DARLING DOWNS.

Read at the usual monthly meeting of the Queensland Philosophical Society, 7th December, 1875.

At the request of a few of the members of this Society, I have consented to give the benefit of my experience as to the localities on the Darling Downs where the fossil remains of extinct Marsupials have been found. The Downs is worthily called the "Garden of Queensland," as it is capable of returning the grazier and farmer a large profit for his outlay; and to the scientific man it contains treasures innumerable and invaluable. It has often been a source of wonder to me that, where these specimens are so easily got, there should not be even one of our legislators who would say a word in favor of a systematic search being made, and these treasures thereby unearthed and recorded in the annals of Science. At the suggestion of Professor Owen, the Legislature of New South Wales voted £150 for the exploration of the Breccia Caves, Wellington Valley; and two scientific men—Professor Thomson (of the Sydney University) and Mr. G. Krefft (of the Sydney Museum) were sent out, and they were fully repaid for their trouble; or, as the *Times* of December, 1869, says, "With astonishing and unexpected results." It may not be out of place to give the following note on the Downs by Dr. Leichhardt, which accompanied some fossils sent home July 10th, 1844:—"The Darling Downs are extensive "plains, formed by broad shallow valleys, without trees, covered "only with grass and herbage, which grows luxuriantly on the "rich black soil, in which concretions of carbonate of lime are "frequently found; ranges of low hills, forming long simple "lines with sudden slopes and flat-topped cones, accompanying "these valleys, and having an open forest formed of various "species of stunted Eucalyptus. All these hills are formed by "a basaltic rock, containing frequently crystals of peridote, and "being often cellular—sometimes real scoria. The base of the "rock, however, is feldspathic; and as the peridote is frequently "absent, the rock becomes uniformly grey, forms a white globule "before the blow-pipe, and is therefore to be classed among the "trachytes or phonolites. The plains are filled by an alluvium "of considerable depth, as wells, dug 50 to 60 feet deep, have "been sunk within it. The plains and creeks in which fossils "have been found are—Mr. Hodgson's Creek, Campbell's Creek, "Mr. Isaacs' Creek, and Oakey Creek. They pass all into and "through immense plains on the west side of the Condamine, "into which they fall. The bones are either found in the bed of "the creek, particularly in the mud of dried-up waterholes, or

" in the banks of the creek, in a red loamy breccia, or in a bed " of pebbles, containing many trachyte pebbles of the coast " range, from the west side of which these creeks descend." These fossils have been known for a great many years, Sir Thomas Mitchell, C.B., having sent specimens home as early as 1842. When writing in January 3, 1842, and forwarding specimens of *Diprotodon Australis*, he places the locality in latitude 28° S., longitude 150° E., and thus speaks of the Condamine River :—" This stream is remarkable from forming large basins " at some places, and losing its course in swamps at others, and at " other parts again cutting its course in a deep channel, through " deep beds of alluvium, in which these bones are brought to " light." It is evident that the place thus spoken of by Sir T. Mitchell must be between Leyburn and Yandilla —unless wonderful changes have taken place since that time—as that is the only locality in which the Condamine loses itself at the present time.

In the years 1843–5, we hear of Mr. E. C. Hobson, M.D., making discoveries from the Quaternary gravel, Mount Macedon, Melbourne, in a swamp or bog, at a depth of 4½ feet, of which, in a letter dated January 1st, 1845, he writes :—" After digging " through a solid peaty soil for 3 feet, you then arrive at a " stratum of gravel, about 18 inches thick, in which the bones " are deposited ; this layer rests upon a bed of firm clay, which " is unfossiliferous." Then comes next in the list of discoverers Dr. Leichhardt (1844), that much lamented explorer ; followed by P. Mayne, Esq., Count Stryelecki, Melbourne and Wellington Valley (1844) ; F. N. Isaacs (1849), Gowrie ; and many others, up to the present date, when link by link has been gradually added ; but the desire to become more acquainted with these extinct races of animals is waning—the old enthusiasts dying off, and none treading in their path. In fact, in my rambles, I have been surprised to find men of education totally ignorant as to these bones being those of extinct animals, and many of them believing them to be bullock bones ; but I must give credit to the few that I have met—among the farmers and boundary-riders especially—willing and able to give me some valuable information as to the whereabouts of these remains.

We have now a Museum in embryo of our own, and shall be expecting to have some specimens of these extinct animals in it ; but we shall not, if there is not a better spirit shown by those in power to parties willing and able to give their assistance. I do not mean in a pecuniary way only, but for room for those specimens that are already there, so that students of Geology or Palæontology may become familiar with them ; and, what is more, to make that Museum valuable, there must be attached a Library for reference, so that the latest discoveries may be known, in order that we shall all be working in the light, and not groping about in the dark, imagining we have made great

discoveries, to find that others have been before us. I think by the foregoing remarks I have wandered from my subject, but I will now try and remedy the error by leaving town and proceeding to Gowrie at once, the great nest of fossil remains.

Gowrie, the property of George King, Esq., is situated on a creek of that name—or, as it was called in olden times, Isaacs' Creek, which rises in the ranges near Toowoomba, and, forming itself from a swamp, runs through that place until it becomes a fine running creek (now never dry), and empties itself into Westbrook Creek, which runs into Oakey Creek, and from thence into the Condamine River. The bank of this creek, from the Gowrie Junction Railway Station until it goes into Westbrook Creek, is more or less rich in fossils. The portion from the junction to the railway bridge, Dalby line, has only had a few stray bones found in it, as the black soil there is very deep, and, in my opinion, the strata containing the fossils are only just now becoming exposed; but from thence to the boundary of Gowrie is very rich. After any ordinary flood, it is possible to go out and get a great many specimens. I have found specimens of *Macropodidæ*, the most prevalent of late, although I have found a few very perfect mandibles of *Nototherium*.

It was in what was called the "Dog-trap Paddock," about two miles below the head station, that Mr. G. B. King and myself discovered the jaw of a *Diprotodon*, together with the foot bones of that animal.

In the same creek I also found a small reptilian jaw, which Dr. Bennett pronounced to be *Chlamydosaurus*, which he forwarded to Professor Owen, and had his opinion confirmed in the following letter:—"The portions of a jaw with teeth are "those of *Chlamydosaurus*, but of a species with a shorter, more "obtuse and higher head than *Chlamydosaurus Kingii*. I have "therefore entered it, and shall find a place in some plate for "figuring the fossil as *Chlamydosaurus Bennettii*." Close to this was found a mandible of *Thylacoles carnifex*. The nature of this animal is very much disputed, Professor Owen placing it as a *Carnivore*, but Professor Flower, Krefft, and others disagreeing with him on that point, each having good reasons for their opinions. Mr. Krefft, in his Notes on the Mammals of Australia, published in the *Sydney Mail*, says:—"The supposed "marsupial lion, believed to have been the 'fellest of the fell,' "was, after all, a harmless creature, which is proved by his weak "incisors, small canines, and the highly inflicted scooplike angle "of the jaw. This animal bruised his food with a formidable "premolar tooth, whereof one was developed in each ramus "above and below." Cuvier's well-known sentence, about the molar of a mammal explaining its character and position in the system, failed in this instance. Thylacoles was just three times the size of the native Bear.

It was noted the other day, in the telegrams from Melbourne, that a jaw of this animal had been found and sent to Professor McCoy to be examined and described; but, in the papers up to date, nothing has been written to state its value to science. To decide the disputed points, it is required that an entire lower jaw, or entire half or ramus, should come to hand. About ten yards lower down the creek I found the complete foot of what Dr. Bennett and others pronounced to be that of *Thylacoles*; but in this matter Professor Owen would not agree, unless they were found in such positions so as to identify them with other remains of *Thylacoles*. It will be very difficult indeed to find specimens as perfect as that, as I have had to walk miles, down even Gowrie Creek, and find only one specimen of a species.

Specimens of *Diprotodon Australis* were also found. Mr. Krefft, in a letter to the *Sydney Morning Herald*, thus describes the *Diprotodon*:—"The *Diprotodon* was as bulky as the largest "living elephant, but stood low on its legs, which bore much "resemblance to those of the *Proboscidean*. The feet, however, "were more like those of the *Mylodon*, a South American gigantic "sloth;" and further on, in the same letter, he says:—"I "believe that the animal stood not more than six feet high at "the shoulder, and that the tribe probably lived on coarse "herbage or leaves, felling the trees with their great tusks like "the modern beavers."

On the subject of the connection of this extinct marsupial with *Bradypodal* giants, in part 3, Phil. Trans. Royal Society, Professor Owen thus writes:—"It is true that in the propor- "tions of the limbs, especially in those of the tibia and its "distinction from the fibula, as in some other particulars of the "osteology of the *Diprotodon*, it resembles more the wombat than "the kangaroo; but the more weighty and essential corre- "spondences are with the *Macropodidæ*—the equipedal modifica- "tions are adapted and necessitated by the bulk of the extinct "marsupial herbivores. The most elastic imagination could "hardly stretch to the association of the disproportionate hind "limbs of the kangaroo with a trunk equalling that of a "rhinoceros, for, according to that pattern, *Diprotodon* must have "towered to a height of thirty feet. The departure from the "type of its diminutive modern allies is again interestingly "analogous to that which occurs in the herbivorous Bruta. The "bulk and weight of body in *Megatherium* precluded the propor- "tions of length and slenderness, with terminal prehensile in- "struments in the limbs, by means of which its diminutive con- "geners and contemporaries have been enabled to withdraw "themselves from an unequal conflict in the safe shelter of lofty "trees. In like manner, the weight and bulk of *Diprotodon* "militated against its enjoying the privilege of the elongate,

"saltatory limbs to which its small congeners and contemporaries "the kangaroo have owed their safety, or the scansorial ones by "which the koala climbs out of danger."

After spending about a week at Gowrie, I left for Eton Vale, the property of Messrs. Hodgson and Ramsay, situated on Hodgson's Creek, about eight miles from the town of Drayton. Although, in former times, many good specimens had been found there, on a previous occasion I had visited this place without any success at all. At that time, I went up from the head-station to the head of the creek, which rises in the Main Dividing Range, and from the time I started until my return, I never even saw the sign of a bone, which was very disheartening, as I saw the drift in which they are usually to be found, and everything looking most promising; but I was doomed to disappointment, after having gone fully ten miles. So this time I did not expect to obtain much, but I was very successful, which made up for previous disappointments. On leaving the station, I proceeded down the creek, and, after going about two miles, I found a very good specimen of *Diprotodon*, which appears new to me; but I have since sent it to Dr. Bennett, for his opinion. It is in a very brittle state, but, I have no doubt, will be fit for inspection and record.

I then proceeded about a mile further, when I obtained a very nice and perfect mandible of the genus *Nototherium*, of which genus there are many species. As in the previous fossils, Queensland is the foremost in yielding the earliest specimens of this fossil; Sir T. Mitchell, C.B. (1842), and Dr. Leichhardt (1845), being amongst the first to send home specimens of this genus. Professor Owen thus speaks in his paper on the *Nototherium*, in the Phil. Trans. of the Royal Society, 1871:—"So "much of the molar teeth as remains in the mutilated mandibles "transmitted to me in 1842, by Sir T. Mitchell, from the bed of "the Condamine River, indicated their transversely two-ridged "character, and suggested, at first sight, that the fossils might "belong to some smaller species of *Diprotodon*. Closer "scrutiny, however, showed them to be parts of full-grown "animals, and that they could not be the young of any larger "extinct herbivore. Moreover, sufficient of symphysial or "anterior part of one of the mandibular fossils remained to "demonstrate the absence of any incisor developed as a tusk or "defensive weapon, such as coexisted with the bilopkodont molar "tooth in *Diprotodon*. The small portions of the enamel on the "remaining bases of the molars (for the crowns all had been "more or less broken) showed a smoother surface than that at "the corresponding parts of the molars in *Diprotodon*. I was "therefore led to recognise with much interest, in the fossils "transmitted by my esteemed friend, on his return to his duties "as Surveyor-General of the Colony of Australia, after the "publication of the work containing the first notice of

" *Diprotodon*, evidence of another genus of extinct herbivorous " marsupials, second only in bulk to that first discovered, and I " proposed the name of *Nototherium* (*Notos*, South; *therion*, " beast)."

Mr. E. S. Hill (of Sydney) had, in 1863, sent some very valuable specimens, through Sir D. Cooper, Bart., to the British Museum, which were obtained at Eton Vale; but I had great difficulty in finding any clue as to the localities in which these specimens were found—most probably Emu Creek, about four miles from the head station, as that creek seems to be about the richest part of the run.

I then proceeded about three miles farther down the creek, passing over the Warwick and Toowoomba Railway line at the Cambooya Station, and found a bank, evidently a good place for my labors. I then proceeded down near the water, when, to my delight and surprise, in the water, at a narrow part of the creek, I saw a mass of fossils, a great quantity of vertebræ being exposed. It being late, I could not do much that night; so on my return to the station, I requested a gentleman, who was there on a visit, to accompany me next morning to exhume them. Next morning we proceeded, with hoe and shovel, to our work, and after making a small dam, and cutting a trench to turn the course of the water, we exhumed about a dozen vertebræ and twenty ribs of *Diprotodon*, but could not find any jaw or other more valuable bones. I hope shortly to be able to forward them to the Brisbane Museum, with a few others that I am keeping for that institution.

I then went further down the creek, and found a good many other specimens, but in too mutilated a state to be of any value, as the sheep and cattle coming to water had, more or less, broken them up. Amongst them, in a very fair state of preservation, was a vertebra of that huge lizard *Megalania prisca*, in speaking of which, in a letter to Dr. Bennett, Professor Owen says:— " How I long for a bit of the jaws, with teeth, of that reptile." I must certainly say, I long to have the gratification of supplying his want. It seems very extraordinary that stray specimens of the vertebræ of this reptile should be the only bones we can obtain—so in this case there is a field for future discovery.

This creek runs out into swamps on the lower end of the Felton Run, but it does not appear very rich after it receives Emu Creek. A little below this junction a very good seam of coal shows itself. Emu Creek, which gives its name to a very rich agricultural district, gives signs of being rich in fossils, but I have not been able to bestow on this place the time I would wish—as my time is so limited, I can only give it a very superficial examination. The most of the specimens obtained here have been of the genus *Phascolomys*. The first specimens recorded of this genus are by Sir T. Mitchell, C.B. (1836), from the Breccia Caves, Wellington Valley; and Mr. Turner (1847),

from King's Creek, Darling Downs. There are a great many species of this genus; it belongs to the family *Pascolomyidæ*, and is thus described by Krefft, in his Notes on the Mammals of Australia, in the *Sydney Mail*, November 8th, 1873:—"This "family comprises the wombats, which retain many of the "Phalanger characters, but are chiefly distinguished by their "peculiarly continuously-growing teeth. The incisors are two "above and below, canines not developed, grinders five in each "ramus above and below, the first being a premolar. The crown "of very young wombat molars resembles that of *Diprotodons*, but "this peculiarity is soon lost when the teeth get into use. Their "insertion is in this manner, that both sides, when seen front in

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"front, would figure like this (), the upper ones turned outward, "the lower ones inwards. The incisors above and below are "formed like the first pair of the Lygomaturus teeth, whilst the "lower ones resemble the *Diprotodon*—a curious fact, which "points to one common progenitor."

From Eton Vale, I proceeded to Pilton, the property of the Hon. W. Wilson, M.L.C., which is situated on the heads of King's Creek, which also runs through that magnificent property of W. B. Tooth, Esq., Clifton, and empties itself into the Condamine River. This creek is generally considered one of the richest in fossils, and I think at a future date some very perfect specimens will be got, as at the upper part of the creek every flood exposes fresh beds. I proceeded over to the Back Creek, a tributary of King's Creek, where on the occasion of a previous visit I was able to get a perfect lower jaw of *Diprotodon*, which proved to be a most valuable addition, as it contained a tooth that had only been conjecturally restored by Professor Owen, and which (in his letter to Dr. Bennett) he says, "offers the best "generic distinction from *Nototherium*." I was not enabled this trip to add much to my collection, as being late in visiting this locality, the sheep, watering at the creek, had again destroyed my chances.

Perhaps, from my remarks, many persons may be under the impression that specimens are only obtained in the banks of creeks. On the contrary, Dr. Bennett, in his "Notes on Queensland," mentions a case where they were found in a well 131 feet deep; and Mr. Place, of St. Helen's, West Prairie, kindly brought me in some specimens (amongst which I readily recognised wombat teeth) that had been obtained in a well, sunk on his property, at a depth of 85 feet; and I know of many other instances of the same at various depths. These discoveries of fossil mammals, and the late discovery of nuts and leaves at the Clifton Colliery, makes us wonder what this country was in former times. I am under the impression that these plains must have been vast lakes, gradually filled up by deposits from the ranges and upheavals by volcanic agency. In the case of the

discoveries made at Clifton Colliery, by Mr. Simpson, I think more notice should be taken of them than the usual notice given in the local papers, as I consider it is the duty of a scientific society to let nothing pass without description; and I am sure the donor cannot think his discovery is valued, if no further notice is taken of it.

To return to the consideration of the localities in which fossil remains are to be found, I think I can put the boundaries pretty well from Gowrie to Spring Creek, Clifton (none are recorded as being found in Dalrymple Creek, on the Warwick side of Spring Creek); thence to the Condamine River, and along its eastern bank as far as Chinchilla (where I have seen specimens embedded in the rock). These boundaries include Eton Vale, Clifton, Pilton, Gowrie, Yandilla, Cecil Plains, St. Ruth, Jimbour, and Warra Warra, Jimbour Station being the northern boundary; so the area to be searched is limited, and a small sum, judiciously expended after a heavy flood, may yield some very valuable specimens.

I think I have now treated as much on this subject as my limited experience will allow, being only an amateur; and if it had not been for my father (Dr. George Bennett, F.L.S., of Sydney) keeping me posted up in all the latest discoveries, I could not have attempted it at all. I am also indebted to him for making the study of these marsupials a pleasure to me, by his valuable notes on my specimens, which at first I only undertook as a duty; but with such encouragement it has grown into an ambition to further the advancement of these enquiries. To Professor Owen I am also indebted for sending me his papers on the fossil mammals of Australia, as they have been read before the Royal Society of England.

If the foregoing remarks will only induce some energy to be thrown into this particular branch of Science, my labors in this short paper will be well rewarded.

By Authority: J. C. Beal, Government Printer, William street, Brisbane.

THE

HABITAT AND PECULIARITIES

OF

SOME OF OUR TIMBERS.

BY

The Hon. W. PETTIGREW, Esq., M.L.C.,

TIMBER MERCHANT.

A Paper read before the Queensland Philosophical Society, 2nd September, 1877.

BRISBANE:

J. C. BEAL, GOVERNMENT PRINTER, WILLIAM STREET.

1878.

QUEENSLAND PHILOSOPHICAL SOCIETY.

The usual monthly meeting of the Society was held at the Society's rooms, Brisbane Museum, on 2nd September, 1877. The following paper was read by The Hon. W. Pettigrew, Esq., M.L.C.:—

ON THE HABITAT AND PECULIARITIES OF SOME OF OUR TIMBERS.

Seeing that large numbers of our trees are being planted in various parts of the world, and knowing that mistakes may be made in not planting the most suitable trees in certain positions, I have been induced to put in writing what knowledge I possess of our timbers, so that others may benefit thereby.

In preparing this paper, I have been indebted to A. C. Gregory, Esq., C.M.G., F.R.G.S., our vice-president; Mr. Walter Hill, of the Botanic Gardens; Mr. Thomas Petrie, North Pine River, and others.

The following remarks have reference to the timbers that grow within a limited distance of Brisbane, and along the coast as far as the Mary River, or, say, from the 26th to the 28th degree of latitude, and within twenty miles of the coast:—

There are two great divisions of the country in which our timbers grow. The one is called forest, and the other scrub. Forest trees do not grow in the scrub, and scrub trees do not grow in the forest. In some places the line of demarcation is very distinct. In the forest grass grows and bush fires occasionally take place, which destroy the young bushes, and keep the country clear. In the scrub there are no bush fires. Even the leaves on the ground when dry will not burn, unless heaped together. It is by this wise arrangement of Providence that we are indebted for the large number and variety of timbers that exist in the scrubs.

In addition to these two distinct divisions there is another called brush. In some places it exists between the forest and the scrub, and in others it covers considerable areas of country. At intervals of several years bush fires run through it. Where brush occurs between forest and scrub it is difficult to define where the one ends and the other begins. Sometimes trees that properly belong to the scrubs are to be found in the brush, but if there, they are seldom of any size. The brush timber is much the same as that of the forest, although there are some trees that only grow there. With these premises, I will now refer to the trees that grow in scrubs.

The Bunya Bunya (Araucaria Bidwillii) may be said to stand out first, being a noble tree and producing an edible nut. The farthest indigenous tree south that I know is one at the north end of the Caboolture Bridge.* About twenty miles farther north is where they begin to grow in numbers, namely, near Melum. From there to Coorooey, along the Blackall Range, and on the eastern side thereof, they grow in large numbers. They grow only in scrubs. On the northern branch of the Maroochy River the Moreton Bay pine and bunya are growing together. The bunya tree is prohibited by Government from being cut by timber-getters. It grows rapidly in favourable situations, as is to be seen in the Botanic Gardens. George Raff, Esq., had one cut down at New Farm which had been planted about twenty years. Part of it was cut at my mill. The length of the part cut was 12 feet, and diameter at small end was 16 inches.

The Dundathu pine (Dammara robusta) is a large tree in suitable places. The largest I have seen grew on a hill to the south of Double Island Point, and about two miles from the sea. They grew in a valley between sand hills. Several of these were seven feet in diameter. The southern limit of this pine tree is about Coorooey (lat. 26° 20′), a little north of Maroochy River. It extends north to the Kolan River, and I am informed it grows on the ranges to the west of Cardwell, also in Trinity Bay. Dry sandy ground, with plenty of vegetable matter and plenty of rain, seems to suit this tree best, and only in such places do large trees grow. The specimens of this tree in the Botanic Gardens do not appear to thrive well. The ground is too clayey for them. This tree ought to be cultivated. It is our most valuable pine, as it is easily worked with either saw, plane, or chisel. It is used for making doors, sashes, mouldings, and other joiners' work In Sydney it is being extensively used for these purposes in the place of cedar. It grows very rapidly in suitable places.

Moreton Bay Pine (Araucaria Cunninghamii) ; native name, Brisbane, Cumburtu, Wide Bay, Coonam.—This useful tree grows in scrubs, over a large extent of country. It grows on the Richmond River, in New South Wales, in the 29th degree of latitude, up to Cardwell, in the 18th degree of latitude, and over the intervening country. It grows in a great variety of soils ; some on sand, as at Tincan Bay ; on the Brisbane slate, as at the upper part of the North and South Pine Rivers, Ithaca Creek, and Enoggera Creek ; on the older Devonian slate, as at Moggill Creek ; and on basalt covering coal shale, as at the Rosewood Scrub to the west of Ipswich. Where it has a

* Thirty-seven years ago this tree was seen by Mr. J. Petrie, and was then about a foot in diameter. It is now 3 feet 5 inches, showing a growth of nearly $\frac{1}{8}$ of an inch per year.

well-drained, deep, loose soil, it grows to a good size. This timber is largely used in house-building. Indeed, three-fourths of the timber used in our wooden buildings is Moreton Bay pine. In first-class houses it is still used for flooring, ceiling joists, rafters, and battens or boarding. It is also used for the bottoms of punts, where, if it is kept constantly wet, it lasts remarkably well. Where this pine grows on anything like level ground farmers know they can grow maize, sugar-cane, &c.; and therefore many pine scrubs are cleared for cultivation, to the injury of the country, from a timber-merchant's point of view.

Cypress Pine (Callitris columnaris).—Native names: Wide Bay, Coolooli; Brisbane, Pooragri. This tree grows on sandy ground along the coast, on the banks of creeks, and on the islands in Moreton Bay and Wide Bay. Salt seems to be requisite for its growth. It grows in forest ground. The largest I have seen were grown on islands a few miles to the south-east of Cleveland. It is used for piles for wharves and for sheathing vessels and punts, as it resists the attacks of the cobra for a time; cabinet-makers use it, as it takes a fine polish and looks well.

She Pine (Podocarpus elata).—Native name: Kidneywallum. This tree grows in scrubs, in brush, and even sometimes in the forest. It grows in a great variety of soils. I have not observed any growing to the north of Noosa of any size. It is to be found near Mooloolah and from that to the southern boundary of the colony. It has recently been found that it resists the cobra, but not so well as cypress pine. It has been used as piles for wharves, also for sheathing vessels and punts. Both this and cypress pine are rather brittle, but this not so much so as the cypress; it is also used for masts and spars of vessels. None else is used by our harbour master.

Red Cedar (Cedrela Toona).—Native names: Brisbane, Mamin and Mugurpul; Wide Bay, Woota. This magnificent deciduous tree grows in scrubs on granite, basalt, and Devonian slate, also on the banks of creeks and rivers descending from country of such formations. It is extensively used for joiners' and cabinetmakers' work. It is the highest-priced timber we have got, and is getting very scarce. As it grows to advantage in only a few localities, it will repay cultivation in those places.

Light Yellow Wood (Flindersia Oxleyana).—Grows in as many different soiled scrubs as the Moreton Bay pine. It grows plentifully on the lower Devonian slates at the Albert River. There is a limited demand for this timber by cabinetmakers, coach-builders, and others. It takes a very fine polish. White ants do not eat it when used in house building. It must be kept dry. It twists and decays if subjected to the weather. It is used for masts and spars of vessels. This is the only timber that I know of that the white ants do not eat when kept dry.

Dark Yellow Wood (Rhus Rhodanthemia), Tulip Wood (Harpulla Pendula).—These trees grow in scrubs on the alluvial banks of rivers. They are esteemed for cabinet work.

Silky Oak (Grevillia Robusta).—Native name: Tuggan Tuggan. This is a quick growing tree, found in scrubs on same formations as Moreton Bay pine. The timber is used for coopers' work, for cabinet work, and shingles for houses.

Beech (Gmelina Leichhardtii).—Native name: Cullouen. This valuable timber grows in a variety of scrub soils. The largest I have seen grew on Buderum Mountain, at Mooloolah, on basalt, along with cedar. Again on sandy ground, near Double Island Point, along with pine. Also on Brisbane slates. This timber is found in scrubs in New South Wales. I have seen several trees over 5 feet diameter at 6 feet from the ground, and a trunk or boll of 50 feet long. There is a large demand for this timber for flooring boards and deck planks; also, a limited demand for many other purposes. It is easily cut or carved, and polishes fairly. The white ants do not readily attack it. This is the next highest priced timber to cedar, and ought to be cultivated. Mr. Hill informs me it is difficult to propagate. The seeds are ripe in January. After a tree has had a crop of seeds, several years elapse before it has another.

Reference might be made to many other scrub trees, but as I can give little or no information concerning their peculiarities, or uses, they are beyond the scope of this paper. Before dismissing the matter of scrub trees and bushes, I may add that they might be used as belts of shelter trees, and also as a stop to bush fires. Both of these, I presume, are much required on the Darling Downs and other places. The ground would have to be fenced off, the seeds sown, or trees and bushes planted, and the grass kept down for a few years till the trees and bushes covered the ground. Be it observed that this is a matter of pure speculation on my part. I do not know that scrub bushes and trees would grow under such circumstances; yet I fail to see why they should not do so. Once they covered the ground and prevented grass growing under them, there would be no danger of bush fires passing through. Gum trees and other forest trees would have to be kept from growing too near to them. Why forest trees grow in one place and scrub trees in another is a subject deserving consideration; yet no reason which I have learned will hold good in every instance. Rough, steep, broken ground, into which the roots of trees can penetrate a considerable distance, is often covered with scrub. Basaltic hills are nearly universally covered with scrub near the coast. On Darling Downs this country has the best grass, and is forest. In the Brisbane slate and sandstone country the ridges are covered with forest timber, but in some of the valleys or along the watercourses there are scrubs. At the same time I know of places where the scrub goes right over the tops of the sandy

hills. In some places it is not the quality but the depth of the soil that determines between forest and scrub. Where the soil is very thin on the top of the rock, or where it is hard, in these instances forest grows.

Reference will now be made to forest timber. I shall first take those that grow nearest to the sea.

Tea Tree, or Paper Bark.—Mr. Hill refers to seven different varieties of this timber. It is used for knees of vessels, or for fencing purposes where more suitable timber is scarce. It grows in swamps or on wet clayey ground. Near Mooloolah it is growing within a chain of high-water mark in swampy ground. It forms a complete breakwind to more valuable timber.

Blackbutt (Eucalpytus pilularis).—Native name, Toi. This tree grows close to the coast on sandy ridges. From the Caboolture River northwards to the Mary River, and including Frazer's Island, there is an immense quantity of it. Although growing best in these localities, it is by no means limited thereto. It grows on ridges in West Moreton, and on the main range at Highfields, and other places. Well-drained ground and plenty of moist winds seem to be the requisites for the full development of this tree. The timber is highly esteemed for house building and many other purposes. We have found that it stands very well for wooden rails for our railway at Tin Can Bay. It would do well for railway sleepers. It is also used as planking for vessels.

Turpentine (Eucalyptus stuartina).—Native name: Tee. This tree grows with the black-butt in the Mooloolah country and to the southward, but I have not seen any about Wide Bay. It grows on sandy or gravelly ridges. The timber is said to be very durable under ground. It is difficult to burn and split, and consequently has not been used for fencing purposes. At Toowoomba it has been planed up for lining boards. It is not plentiful. I think this should do remarkably well for railway sleepers, bridge work, planking for vessels, &c. It grows rapidly.

Syconcarpa lauriafolia.—Native name: Peebeen. This tree has been mistaken for the preceding one. It grows remarkably well on Frazer's Island, and on the top of the ridge close to the sea to about latitude 26° 10′. Although found in favoured localities as far south as 27°, it rarely attains great size. This timber was said to be capable of resisting the cobra, and thereby a great value was set on it by the Government; yet, when tested by the Harbour Master here, it has been found that such is not the case, as the specimens on the table will show, one of which is peeben, another turpentine, and the third swamp mahogany. The latter is not touched; the other two are both eaten into. They were in the water ten months, nailed to piles. At Wide Bay the natives at one time made their canoes of the bark of this tree. What it is specially fit for as a timber I have yet to learn. It warps in drying.

Swamp Mahogany (Angophora species).—Native name, Boolerchu. This timber grows on poor, wet, or swampy land. It attains to a good size. It resists the cobra longer than any other so far as yet known. When cut up into boards or planks it cracks and twists into all manner of ways. Were it possible to keep it constantly wet after being cut, and till fastened into its place, it might prove very useful for sheathing vessels or for protecting the banks of rivers, as, for instance, at Mackay. Mr. John Petrie informs me that some of this timber is to be found that does not crack and warp in the manner herein described, about seven miles from Cleveland.

Stringy Bark (Eucalyptus fibrosa).—This tree grows on sandstone of the coal measures, and on the Brisbane slate. It is used for rails in fencing, not being readily liable to take fire. It makes the best charcoal.

The bark of the four preceding trees is rough, loose, and persistent. On the Blackbutt the bark is persistent on the trunk but deciduous on the branches.

Ironbark (Eucalyptus Siderophloia).—There are two sorts of this timber, one gray coloured, native name, Tanderoo; the other dark-red, native name, Biggera. The Biggera has got a thick ridgy bark, grows in patches on ridges. The tanderoo grows more on flats and sides of scrubs, has a thinner bark, burns much more readily, is not so pipey, and not so readily eaten by the white ants as the Biggera. It is also a tougher timber. These trees grow in a great variety of soils. Twenty-five years ago immense numbers grew in the parishes of Woogaroo and Goodna, on the sandstone, in the coal measures; also on the Brisbane slate, on the north side of Enoggera Creek, Waterworks road. It is used extensively for piles, beams, and planking of wharves and bridges. In house building it is used for beams, joists, studs, and shingles. By wheelwrights for naves and spokes. By shipwrights for beams, keels, and planks, and for sleepers on railways. It is also used for fencing posts and rails. The tree suffers from bush fires, and the white ants eat it.

Bloodwood (Eucalyptus corymbosa).—Native name, Boona. This tree grows in a greater variety of soils and places than any other tree or plant that I know of. It is to be found on the richest soils and in the poorest, in swamps and on the tops of ridges. In rich soils the timber is nearly worthless, as it is full of gum veins or rings. The good sound trees are on poor soil. The timber is very durable on the ground or in the ground. A piece can be pointed out at the North Pine River that was cut into by a cross-cut saw and an axe in the year 1825. It is used for posts in fencing. It does not readily take fire; neither is it soon attacked by white ants. For posts for building, and using the whole log, this timber is superseded by none for durability that I know of.

Spotted Gum (Eucalyptus Maculata).—Native name, Urara. Grows extensively on the Brisbane slates, much more so than any other timber, particularly in the parish of Indooroopilly. The bark has a bluish colour, is thin ($\frac{1}{4}$ to $\frac{3}{8}$ inch thick), smooth, deciduous, and falls off in patches. The timber is used for joists, studs, planking for bridges, buggy shafts, cogs of wheels, &c. It is elastic, close, and durable, and takes a fine polish. Several other trees are called spotted gum, but they do not possess the strength and elasticity of this one.

Blue Gum (Eucalyptus botryoides).—Native name, Mungur. Grows on the banks of our rivers and creeks, and on ground occasionally flooded. The bark is thick (about half an inch or more), deciduous, except a piece about 4 feet to 8 feet at the bottom. Several trees are still to be seen on the river bank in the Domain. This timber is specially adapted for wheel felloes, and is the only timber used here for the purpose. It is also cut for weatherboards, as it does not readily split with nails. It is considerably inlocked and elastic. A tree very similar to this grows on the ridges, but has a thin bark in comparison. The timber, though fit for many purposes, is quite useless for felloes; it splits longitudinally on drying.

Gray Gum (Eucalyptus Saligna) grows on the Brisbane slates and other ridges. I do not know of its being a plentiful timber in any locality. It is used for building purposes, and does very well for rails for fences, as it does not readily take fire. Fences of bloodwood for posts, and this for rails, are considered the safest from fire and most durable against the attacks of white ants. This timber is often split into shingles and sold for ironbark, very few people being able to challenge them.

Box grows on flat, clayey ground of the coal shales. It is plentiful up Woolston Creek, near to the railway. It has a thin, grayish bark, which sheds in strips twenty to thirty feet long. The timber is in good repute for building purposes, also for poles and shafts of drays.

Bastard Box (Tristania Conferta).—This tree, but of no great size, is plentiful on the ridges near Brisbane. It has strong spreading branches and a good shade. If cut down or burned down it springs up from the roots. It would make a fine shade tree for the streets. The timber is of no account for sawing, as it twists and gets uneven in drying. A similar tree grows in the scrubs near Double Island Point, native name, Weerabi; also in similar places up Moggill Creek. In these places it is a tall, straight, solid tree. Not having cut any from such places, I am unable to refer to its qualities.

Flooded Gum (Eucalyptus Grandis).—Native name, Toolur. Grows in brush on basalt, or on the edges of scrubs. It has a white bark which peels off right down to the ground. It grows to a great height, and is the lightest of all the gums

hereabout, floating in water soon after being cut. It is easily cut by saw, but shrinks very much in drying. It is used for weatherboards, and sometimes for making parts of drays and carts. Also used for masts, spars, and planks of vessels.

These are the principal forest trees that are in common use amongst the colonists. There are the oaks and wattles that exist as underwood throughout the forest country embraced in this paper. The oaks are used for axe, pick, and hammer handles, and are good firewood. The wattles in some places are stripped of their bark for tanning purposes, but where the grass is eaten down, and no strong bush fires occur, the wattles grow up and destroy the grass.

There are several gums which I have not mentioned, because they have no peculiarities worth mentioning. Some of them are worthless so far as timber is concerned.

Several of the eucalypti shed their seed about the end of November or beginning of December.

The Bunya Bunya is ripe about the end of January.

The Dandathu and Moreton Bay pine shed their seed about the end of December.

Cypress pine in November.

Red cedar seeds ripen about end of January.

Beech seeds are ripe in January.

The speaker also showed samples of the timbers described, in explanation of his remarks, and on the conclusion of the paper, a motion that it be printed in the transactions of the Society was put and carried.

By Authority: James C. Beal, Government Printer, William street, Brisbane.

Queensland.

PITURI AND DUBOISIA.

PAPER

READ BEFORE

THE QUEENSLAND PHILOSOPHICAL SOCIETY

BY

JOSEPH BANCROFT, M.D.

BRISBANE:
BY AUTHORITY: JAMES C. BEAL, GOVERNMENT PRINTER, WILLIAM STREET.

1877.

PITURI.

PAPER READ BEFORE THE QUEENSLAND PHILOSOPHICAL SOCIETY, OCTOBER 25, 1877.

This is the substance chewed by the natives of some parts of Central Australia as a stimulating narcotic. It is mentioned in writings of Australian explorers, and is spelt "bedgery," "pedgery," "picherie," "pecherie," "pitury," and otherwise. Until recently the broken leaves of the pituri could not be identified with those of any known plant, and many hours have I spent in comparing them with the flora of the neighbourhood of Brisbane. Sometimes I thought I had found the plant, but on experimenting with the extract of the leaves, none of the peculiar phenomena of the pituri were noticed. All the little seed-like particles that possibly could be found amongst the samples of pituri to hand, were carefully collected and sown in warm frames by favour of the Acclimatisation Society, but to no purpose. Vainly have I asked numerous travellers into the western country to obtain seeds for me, but up to the present time none are forthcoming. One step, however, has been gained of some importance. It came to my knowledge in February last that Mr. W. O. Hodgkinson had recently arrived from exploring the north-west border, and had brought with him some pituri. I forthwith paid this gentleman a visit and found that he had gathered some tops of the pituri bush with his own hands. These specimens Mr. Hodgkinson kindly placed at my service. To make quite sure of the nature of the plant, I tried an infusion of it by subcutaneous injection as in my former experiments, this giving the usual physiological action of pituri. I gave some leaves to Mr. Bailey, the botanist, for transmission to Baron von Mueller, of Melbourne, to which the learned Baron gave the following reply:—

13-2-77.

I am glad, dear Mr. Bailey, that at last the doubts concerning the origin of the Pituri poison seem solved. The specimens procured by Dr. Bancroft's efforts, though without flowers and fruits, appear

certainly referable to my Duboisia Hopwoodii *(Frag. Phytograph, vol. x. p. 20)*, formerly when fruit was unknown referred to Anthocercis. It comes not quite unexpectedly that the pituri is traced to Duboisia, because I am aware of the poisonous properties of several species of Anthocercis, and this added to my reasons, to restore both Duboisia and Anthocercis to Solanaceæ, from which Bentham had wrongly removed them, to Scrophularinæ. Now an interesting field opens to Dr. Bancroft for further research. Let the Doctor try the foliage of Duboisia myoporoides, as he could easily, for a little payment, get a blackfellow to administer small doses of that plant to. There could be no danger in the experiment if the quantity is given cautiously. I fancy that the properties of the Duboisias will prove similar to those of stramonium.

Regardfully,
FERD. VON MUELLER.

Accordingly I lost no time in preparing extract of Duboisia myoporoides, a small tree common in the neighbourhood, growing plentifully on the borders of vine scrubs, and springing up after the forest of timber has been burnt off. The effects of Duboisia extract on my domestic pets (thanks to the beneficent rule of this colony, where no law prevents professional men from experimenting) are strange enough. Dogs and cats walk about in a helpless blind manner, falling over the least irregularity of surface, and struggle, in the case of the dog, to get through and over all sorts of impassable obstacles. If let alone they go to sleep. They seem blind, or nearly so, with a widely-dilated pupil. Surely this could not be pituri. The widely-expanded pupil looked so strange; could it be that local application on the eye would produce results like atropia? The experiment on a cat was easy of execution, and a little fluid extract was dropped in the eye; in a few minutes the pupil dilated widely, and so remained. Numerous experiments were then made, always with the same results.

I now tried it on some of my ophthalmic cases, and found an action of great rapidity. A very slight irritation is mentioned by patients after a drop is placed in the eye, but this passes away in a few seconds. In from five to fifteen minutes an ophthalmoscopic examination can be made.

I gave extract to Dr. Thomson of the Brisbane Hospital, and Dr. McIntosh of the Ipswich Hopital, who both confirmed my observations. I use the Duboisia now regularly in place of atropia, and in several extraction cases found it to act satisfactorily.

Dr. Fortescue, an eminent ophthalmic practitioner of Sydney, favoured me with the following exact particulars of its action:—

"*Experiment with watery extract of Duboisia upon the Normal eye.*"

E.C.F.—Age 30.

V=$\frac{20}{20}$ (rather better). Acc=$\frac{1}{3}$ (reads No. 1 Jaeger at 3 inches) Internal rectus overcomes prism of 10°; external rectus of 5°; inferior rectus of 3°.

August 30.—Instil two drops of watery extract of Duboisia. In ten minutes pupil widely dilated; reads No. 1 Jaeger at 4 inches. In fifteen minutes reads No. 1 Jaeger at $5\frac{1}{2}$ inches. In 25 minutes No. 1 Jaeger indistinct at any distance; reads No. 2 Jaeger not nearer than 18 inches. In 30 minutes accommodation completely paralyzed, and $1\frac{1}{2}$ Suellen is put at 24 inches in the attempt to make it out. Internal rectus overcomes prism of 10°, external of 4° (this slight apparent difference is, I think, doubtful)—inferior of 3°.

August 31.—Accommodation still completely paralyzed, pupil a little less.

September 1.—Reads No. 2 Jaeger at 13 inches; pupil diminishing.

September 2.—Reads No. 1 Jaeger at 6 inches; pupil diminished about $\frac{1}{2}$.

September 3.—Reads No. 1 Jaeger at $3\frac{1}{2}$ inches; pupil still less and mobile. At this date, four days after instillation, the effect upon the accommodation has practically gone off though a considerable mydriasis remained, and some slight dazzling and uncertainty of vision for 3 or 4 days longer.

E. Fortescue.

The genus Duboisia, named by Robert Brown after a French botanist, is placed by Bentham, first on the list in the order Scrophularineæ, p. 475, Flora Australiensis, vol. 4; the next genus is Anthocercis, p. 474. Anthocercis littorea is figured in Loudon's Encyclopædia, p. 535, the etymology being given. "Anthocercis from *ανθος*, a flower and *κερκις*, a ray; the narrow division of the corolla spreading in a radiant manner, like the spokes of a wheel." It is placed here in Solaneæ.

The following description of the plant in question is copied from the Flora Australiensis, vol. 4, p. 473-474:—

Calyx 5-toothed. Corolla ovate campanulate, the lobes broad, induplicate in the bud. Stamens 4, didynamous, included in the tube, the upper ones the longest, the fifth uppermost one reduced to a minute rudiment; anthers reniform, turned outwards at least when fully out, the cells confluent at the apex. Stigma slightly dilated and 2-lobed. Fruit an indehiscent berry. Seeds few, curved, with a crustaceous tubercular-rugose testa; embryo curved, the albumen not copious.—Small glabrous tree. Leaves alternate, entire. Flowers small, in terminal centrifugal panicles.

The genus is, as far as known, limited to a single species extending from E. Australia to New Caledonia. but it is not improbable that Anthocercis Leichhardtii, of which the fruit is unknown, may prove to be a second Duboisia.

1. *D. myoporoides*, R. Br. Prod. 448. A tall shrub or small tree, quite glabrous. Leaves alternate, from obovate-oblong to oblong-lanceolate, obtuse or rarely acute, entire, contracted into a petiole, 2 to 4 in. long. Panicles terminal, sometimes leafy at the base, usually much branched, broadly pyramidal or corymbose. Bracts minute. Calyx broadly campanulate, with broad obtuse teeth. Corolla about 2 lines long, white or pale lilac, the lobes rather short and obtuse. Stamens included in the tube. Berry small, nearly globular.—Endl. Iconogr. t. 77; Benth. in DC. Prod. x. 191; Miers, Illustr. t. 87; Notelæa ligustrina, Sieb Pl. Exs. Queensland. Brisbane River, Moreton Bay, Fraser, F. Mueller; Rockingham Bay, Dallachy. N. S. Wales. Port Jackson to the Blue Mountains, R. Brown, Sieber, n. 259, and many others; Sydney woods, Paris Exhibition, 1857, M'Arthur, n. 81; Hastings and Clarence rivers, Beckler; Port Macquarrie, Fraser; Richmond River, Henderson; southward to Illawarra, A. Cunningham, Ralston. The Species in also in New Caledonia.

2. *Anthocercis*, Labill.

(Cyphanthera, Miers; Eadesia, F. Muell.)

Calyx 5-tooth or 5-lobed. Corolla-tube campanulate, shortly contracted at the base; lobes 5, spreading, nearly equal or the 2 upper rather shorter or longer than the others, all induplicate in the bud, and the 2 upper slightly overlapping the lateral ones. Stamens 4, didynamous included in the tube, with occasionally a small rudiment of the uppermost fifth one. Anthers 1-or 2-celled, turned outwards in the bud. Stigmatic lobes very short, rather broad. Capsule oblong ovoid or globular, opening in 2 entire or bifid valves. Seeds usually somewhat curved, with a reticulate crustaceous testa. Embryo straight or slightly curved, in a copious albumen.—Shrubs sometimes almost arborescent, glabrous glandular-pubescent or hoary with a stellate tomentum. Leaves entire or rarely toothed, often rather thick. Peduncles 1 to 3-flowered, irregularly arranged in terminal racemes or panicles often leafy. Bracts very small or none. Corolla white or yellow, the tube usually streaked inside with purple or green.

The genus is limited to Australia. As a whole it is a very natural one, immediately connected with none except Duboisia, from which it differs solely in the capsular fruit. The two sections are very readily distinguished by a constant and absolute character, but appear to be too artificial to be conveniently adopted as genera as proposed by Miers. The anthers in the one are those of Petunia, in the other 1-celled as in Duboisia.

Of the 18 species of Anthocercis the two last on the list are A. Hopwoodii and A. Leichhardtii, both are believed to belong to genus Duboisia by Baron von Mueller. The former is the pituri, the second has not been examined. Vol. 4, p. 480-481.


A.V. Thomas. Lith.

17. *A (?) Hopwoodii*, F. Muell. Fragm. ii. 138. A glabrous tree or shrub. Leaves narrow-linear, acutely acuminate, with the point often recurved, entire, rather thick. narrow into a short petiole, 2 to 4 in. long. Flowers in short terminal cymes or leafy pyramidal panicles. Bracts minute. Calyx small, broadly campanulate, with obtuse teeth. Corolla-tube campanulate, 2 to 3½ lines long ; lobes broad, very obtuse, shorter than the tube. Anthers 1-celled. Fruit unknown. N. S. Wales. Darling River, very rare, Victorian Expedition. W. Australia, Drummond (with rather smaller flowers than in the N. S. Wales specimens).

11. *A (?) Leichhardtii*, F. Muell. Fragm. vi. 142. A glabrous shrub (or tree ?), with the foliage and inflorescence of Duboisia myoporoides. Leaves oblong-lanceolate, rather obtuse, entire, narrow into a petiole, quite flat, 2 to 4 in. long. Panicles terminal, somewhat leafy at the base, broadly pyramidal or corymbose. Bracts very small. Pedicels short. Calyx small, broadly campanulate, with short broad teeth. Corolla-tube nearly 2 lines long, ovate-campanulate ; lobes narrow, acuminate rather longer than the tube. Anthers 1-celled. Fruit unknown. Queensland, Leichhardt, the precise locality unknown. The specimens might be mistaken for those of Duboisia myoporoides, were it not for the narrow acute corolla-lobes ; and, as in the case of A. Hopwoodii, until the fruit shall have been observed it is in some measure uncertain whether it should be referred to Anthocercis or to Duboisia.

To return to the history of pituri. My first experiments were described in a short paper read before the Queensland Philosophical Society in March, 1872, and republished in the *Australian Medical Journal*, of November, 1876. As the article is short, and to render this paper as complete as possible, it may be allowed to reproduce it here :—

A Paper read by Dr. Bancroft, before the Queensland Philosophical Society, on the Pituri poison, on Thursday, 28th March, 1872.

A meeting of the Queensland Philosophical Society was held on Thursday, March 28, 1872, at which Dr. Bancroft read a paper on the "pituri" poison, brought by Mr. Sub-Inspector Gilmour from near Cooper's Creek. Some interesting experiments were made, demonstrating the deadliness of the poison to small animals.

Dr. Bancroft said :

On February 9th of this year, 1872, I obtained from Mr. Gilmour a quantity of dried leaves, and the particulars here narrated, of a plant used by the natives as a stimulating narcotic. These leaves, called "pituri," were obtained in the neighbourhood of the water-hole Kulloo, eight miles beyond Eyre's Creek.

The use of the pituri is confined to the old men of a tribe called Malutha, all the males of which tribe are circumcised.

The pituri is carried in neatly-made oval pointed bags, specimens of which Mr. Gilmour has brought.

The old men, before any serious undertaking, chew these dried leaves, appearing to use about a tablespoonful. A few twigs are burnt, and the ashes mixed therewith. After a slight mastication, the bolus is placed behind the ear—to be again chewed from time to time—the whole of which is at last swallowed. The native, after this, is in a sufficiently courageous state of mind to fight, or undertake any serious business.

One old man Mr. Gilmour and party fell in with refused to have anything to say or do until he had chewed the pituri; after which he rose and harangued in grand style, ordering the explorers to leave the place. The pituri caused a severe headache in persons who tried it. The dust given off in examining the leaves causes sneezing.

The above is the information supplied by Mr. Gilmour.

Mr. Wills' diary from Cooper's Creek homewards (page 283) has the following:—"May 7, 1861. In the evening various members of the tribe came down with lumps of nardoo and handfuls of fish, until we were positively unable to eat any more. They also gave us some stuff they call bedgery, or pedgery; it has a highly intoxicating effect when chewed even in small quantities. It appears to be the dried stems and leaves of some shrub."

The pituri consists of leaves broken into small particles, and mixed with it are acacia leaves, small dried berries containing reniform seeds and unexpanded flower buds of the shape of a minute caper.

The seeds picked out have as yet not germinated, indeed have decayed; and from this reason, together with the brittle and broken condition of the leaves, causes me to suspect that they have been dried by artificial heat. I do not, however, find any scorched leaves or burnt matter mixed therewith. Mr. Gilmour also gave me a small bunch of twigs, some as thick as a pen-holder; these appear as if broken from a tree. The leaves are narrow lanceolate, and when complete may be an inch long and an eighth of an inch broad. It is impossible to find an entire leaf.

On February 22, I made an infusion of one drachm of the pituri in one drachm of water. Of the solution obtained, thirty drops were injected under the skin of a half-grown cat; the animal died from suffocation in one minute, the heart continuing to beat for some time afterwards. Seven drops of the same solution injected under the skin of a puppy caused death by suffocation in a minute and a-half, the heart continuing to beat as before. The same quantity killed small rats with great rapidity.

On March 3, I commenced experiments with the extract obtained by evaporating the watery infusion. The extract is of the consistency of treacle, and can be conveniently dropped from an ounce vial.

By evaporating the infusion carefully, minute crystals are formed in great plenty. The crystals are acicular bundles, and are beautifully tinted by the polariscope.

In the infusion is generated a yellow matter, which falls to the bottom of the vessel. This yellow substance has no poisonous properties. The extract also undergoes this change generating carbonic acid by fermentation. A yellow deposit also goes to the bottom.

This, as in the case of the infusion, contains large compound spherical cells, also crystals, which are probably the active principle. The poisonous effects are not destroyed by fermentation.

On frogs, a solution of the extract acts speedily, if applied to the skin. Increased activity of respiration occurs, followed by torpidity; during which the frog can be placed in curious attitudes, from which he will make no efforts to move. The web of the foot can be placed under the microscope, to examine the circulation of the blood, very conveniently when in this torpid state; the heart continues to beat feebly for many hours. Frogs will recover after twenty or thirty hours of this condition of inactivity. Grasshoppers will come to life again after an apparent death of two or three days.

The warm-blooded animals will not recover if respiration be not re-established very shortly after the suffocative attack.

When from a quarter to half a drop of the extract diluted with water has been injected under the skin of a rat, the following symptoms are observed:—In less than one minute, the animal becomes very excitable, and jumps and starts with the slightest provocation; it appears to have lost the power of restraining itself. Shortly, irregular muscular motions occur, passing rapidly into a general convulsion. The animal opens its mouth as if longing to breathe, but no regular respiratory act follows. Opisthotonos is well marked in some cases. After a few seconds of quiet from muscular effort, during which the heart may be seen to act powerfully, a gasp for breath follows, which is generally a sign that the poison will not prove fatal. This is succeeded by others, and very shortly rapid respiration takes place of a feeble kind. The animal now gradually regains consciousness. The respirations fall to the normal standard. Weakness and torpidity romaining for several hours, during which, however, voluntary exertion takes place with very little stimulus. In two instances death took place during this period of torpidity.

The effects of the pituri are—

1st. Period of preliminary excitement from apparent loss of inhibitory power of the cerebrum, attended with rapid respiration; in cats and dogs, with vomiting, and profuse secretio nof saliva. In dogs there is retraction of the eyeball.

2nd. Irregular muscular action, followed by general convulsion.

3rd. Paralysis of respiratory function of medulla.

4th. Death, or

5th. Sighing inspirations at long intervals.

6th. Rapid respiration and returning consciousness.

7th. Normal respiration and general torpidity not unattended with danger to life.

The poison, given by the mouth, acts with less vigour; injected into the intestines the results are more certain. The animal has a longer stage of excitement, the convulsive fit is not so severe, and recovery is more certain. Torpidity remains for some hours.

A quarter of a drop injected under the skin of a rat causes excitement; the animal starts with slight noises, may fall over a few

times from very strong muscular irregularities; remains excitable for some time, then gradually becomes torpid.

In small medicinal doses we may expect to find the period of excitement and the torpidity to be the only marked symptoms. In cats and dogs the excitement is not marked, but vomiting of a violent kind occurs.

Mr. Moffat, chemist, of Brisbane, has a small quantity of the pituri. The distance of the neighbourhood from which it was obtained causes me to hope that before long seeds of the plant may be collected, and some exact botanical knowledge of it, and the localities in which it grows, may be forthcoming.

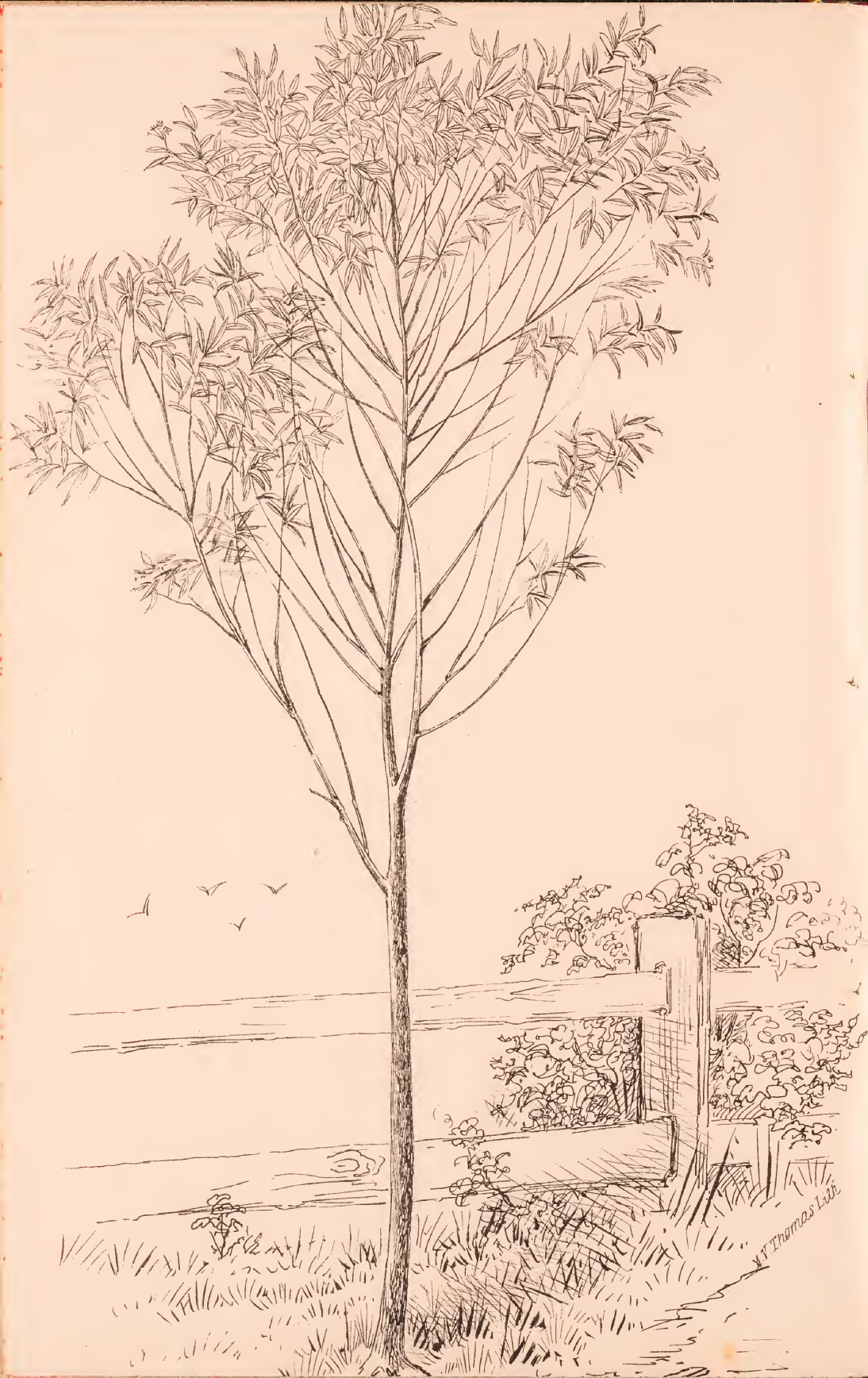
Mr. Hodgkinson's Letter about Pituri.

Kangaroo Point,
15 February, 1877.

J. Bancroft, Esq., M.D.

Dear Sir,

I have much pleasure in giving you the information I possess relative to the herb, specimens of which I had the honour of giving you. Its name, as pronounced by the natives in the district from whence it is procured, is "Petcherie." The locality in which I found it was approximately latitude 22° 53′ 51″, longitude 138° *in situ*. Owing to my ignorance of botany I can give you no other description than this. It is a bushy shrub, attaining, in the specimens from which I plucked the parcel given you, a height of eight or nine feet, with dark thick glossy foliage, leaves of lanceolate form and growing from the base in a regular rounded outline, conferring quite an ornamental appearance. The locality in which it was noted was a sandy spinifex (*Triodia pungens*) flat, flanked by red sand-hills, miserable country, either destitute of water or in the vicinity of saline springs. The whole district, lying between Spencer's Gulf and the Gulf of Carpentaria as it does, bears in a multiplicity of marine remains, strong proof that the connection between the points referred to was at (speaking geologically) no distant date, much closer than at present. Even now salt springs are abundant, and in droughts the surface water existing becomes unfit for consumption. To the natives the habitats of this herb are known by the names of pecherie and pecheringa, and their precise position neither coaxing nor presents would induce them to disclose. In common with other savages under similar circumstances, petcherie and pecheringa are protected by legends from curious inquirers, and the district itself is sufficiently inhospitable to repel intruders, as I had made two days' stages without water when I gathered the specimens I was so fortunate as to obtain. The resident natives carry on a considerable traffic in this plant, representatives of tribes from other quarters coming to procure it. It is used after being sweated beneath a coating of fine sand, as a narcotic stimulant, strictly kept for the solace of the old men or for occasions when long privations have to be endured or some solemnity performed. As I never had the slightest misunderstanding with the natives I am unable to speak of its employment to excite a combative spirit. After being sweated in the sand as before stated, it is dried, roughly pounded up and


Thomas Lilt

stowed in netted bags, skins, or any available wrappings. When used on the march a portion is put into the mouth, chewed until it assumes the form and consistency of a sailor's quid, passed round each one of the party, the saliva promoted by its use being swallowed, and finally it is restored to the original donor who carries it behind his ear, until constant employment has extracted all its virtues. When time will permit, potash prepared from the leaves of any plant suitable for the purpose, is sprinkled over the petcherie, and probably for the same reasons as when used in connection with the betel nut. Your remarks as to the toxicological properties of petcherie must, I confess, astonish me. Sixteen years ago, when with Burke and Wills' expedition, subsequently with Mr. Jno McKinlay, and recently in the north-west expedition, I used petcherie habitually, when procurable, in default of tobacco; and have very often chewed it both in its raw and prepared state. Regretting my inability to offer you more scientific details,

I am, dear Sir,
Yours truly,
W. O. Hodgkinson.

Baron Von Mueller kindly sent me small specimens of various Anthocerci and Schwenkeas, which he could spare from his herbarium. The specimens are too small to be used for physiological experiments. The genus Anthocercis contains 16 other species, mostly West Australian, two are South Australian, and one Tasmanian. Extract of these I would gladly receive to determine if properties of importance exist in the genus. If not, it is still likely that the plant named after Leichhardt will have some valuable powers. The following letter of Baron Von Mueller is important:—

Pitury.

To the Editor of The Australian Medical Journal.

Sir,

Some weeks ago I was asked by our last president about the origin of the Pitury, a stimulant said to be of marvellous power, and known to be in use by the aborigines of Central Australia. It so happened that after years of efforts to get a specimen of the plant, I at last, this week, obtained leaves, and although I have seen neither flowers nor fruits, and although these leaves are very similar to those of various otherwise widely disallied plants, I can almost with certainty, after due microscopic examination, pronounce those of the Pitury as derived from my Duboisia Hopwoodii, described in 1861, (*Fragm. Phytogr. Austr.* II., 138). This bush extends from the Darling River and Barcoo to West Australia, through desert scrubs, but is of exceedingly sparse occurrence anywhere. In fixing the origin of the Pitury, now a wide field for further inquiry is opened up, inasmuch as a second species of Duboisia *(D. myoporoides R. Br.)* extends in forest-land from near Sydney to near Cape York, and is traced also to New Caledonia, and lately by me also to New Guinea.

In all probability this D. myoporoides shares the properties of D. Hopwoodii, as I now find that both have the same burning acrid taste. Though the first known species is so near to us, we never suspected any such extraordinary properties in it as are now established for the later discovered species. Moreover the numerous species of the allied genus Anthocercis, extending over the greater part of the Australian continent and to Tasmania, should now also be tested, and further the many likewise cognate Schwenkeas of South America should be drawn into the same cyclus of research, nothing whatever of the properties of any of these plants being known. The natives of Central Australia chew the leaves of Duboisia Hopwoodii, just like the Peruvians and Chilians masticate the leaves of the Coca *(Erythroxylon Coca)*, to invigorate themselves during their long foot journeys through the deserts. I am not certain whether the aborigines of all districts in which the Pitury grows are really aware of its stimulating power. Those living near the Barcoo travel many days' journeys to obtain this, to them, precious foliage, which is carried always about by them broken into small fragments and tied up in little bags. It is not improbable that a new and perhaps important medicinal plant is thus gained. The blacks use the Duboisia to excite their courage in warfare, a large does infuriates them.

Regardfully yours,

February 15, 1877. FERD. VON MUELLER.

From bags of pituri prepared by the natives, sent me by Messrs. Collins, of Cooper's Creek, and Inspector McKay Dunne, of the Native Police, at Bulloo, I have made extract, and from this Mr. Staiger, Analytical Chemist at the Queensland Museum, has prepared an active principle of great potency. This looks like a brown oil, and has no crystalline appearance, it mixes easily in water, and a drop so dissolved produces on cats and smaller animals all the phenomena detailed in my paper of 1872. Death is caused chiefly as in tetanus by excessive contraction of the respiratory muscles and suffocation. Mice, with small doses of pituri, may at times be seen to walk on their knuckles. Pituri does not dilate the pupil when applied locally, though dilatation is seen to some extent when given by subcutaneous injection. The extreme retraction of the eyeball in dogs is very remarkable.

It is to be regretted that my stock of pituri is so small, I have very little for physiological research, and none for chemical. Until seeds are forthcoming and the plant can be cultivated, little progress may be expected, as the natives value their pituri too highly to give it away, not to speak of the long land carriage after it is obtained from them. The natives near Cooper's Creek say pituri comes from a long distance. It is said to have been seen growing on the Diamantina River. The specimens in the Victorian Herbarium were obtained in the expedition of

Burke and Wills, to whom Mr. Hopwood, of Echuca was a contributor, and of whom Baron V. Mueller says:—"*Speciem "appellavi in honorem præclari, H. Hopwood, Echucensis, fautoris "liberalissima Expeditionis Victorianæ.*" Mr. Hodgkinson's specimens were obtained on the western border of Queensland, in latitude 22° 53′. The specimens of Anthocercis, named after Leichhardt, have no locality attached to them.

In a recent trip to the heads of the Dawson River, about 400 miles, amongst the numerous shrubs having leaves of the form of pituri, I found no traces of the plant.

Of the medicinal uses of pituri little at present can be said. I have given it in some cases of extreme debility, but in doses much too small to enable me to speak of its value. I would expect it to be a tonic nervine that could be used along with alcohol, æther, and ammonia; perhaps, also, with strychnia, to the action of which it has a great resemblance.

I have given Duboisia in asthma and in photophobia. It causes much dilatation of the pupil and indistinct vision, also confusion of intellect, particularly at night, a thirsty dryness of the throat, and loss of taste. At present no valuable results, except the mydriatic, are apparent. An active principle, prepared by Mr. Staiger, when applied to one eye, dilates both, the effect lasting many days. Persons making the extract have on several occasions suffered paralysis of the iris by some unnoticed speck getting in the eye, as I suppose. Mr. Staiger does not find the active principle volatile. A slight tendency to the formation of crystals has been noticed in some preparations, but these have been too small in bulk to experiment upon.

Dr. Rudall and Baron von Mueller were experimenting with Anthocercis viscosa, and noticed dilatation of the pupil in cats in April last. Their experiments at present have not been published.

Since writing the foregoing, I have examined the seeds of the Duboisia with the microscope, and find them to be distinctly kidney-shaped, $\frac{1}{10}$ of an inch long, and regularly covered with small pits. My son then looked over some pituri and discovered the shell of one such seed which, under the microscope, was no way distinguishable from the Duboisia seeds. Persons looking over pituri for the seeds should bear in mind the form here mentioned, as a great variety of other seeds are to be found in the samples collected by the natives. Only reniform pitted seeds would be worth collecting for attempt at cultivating the pituri plant.

JOSEPH BANCROFT, M.D.

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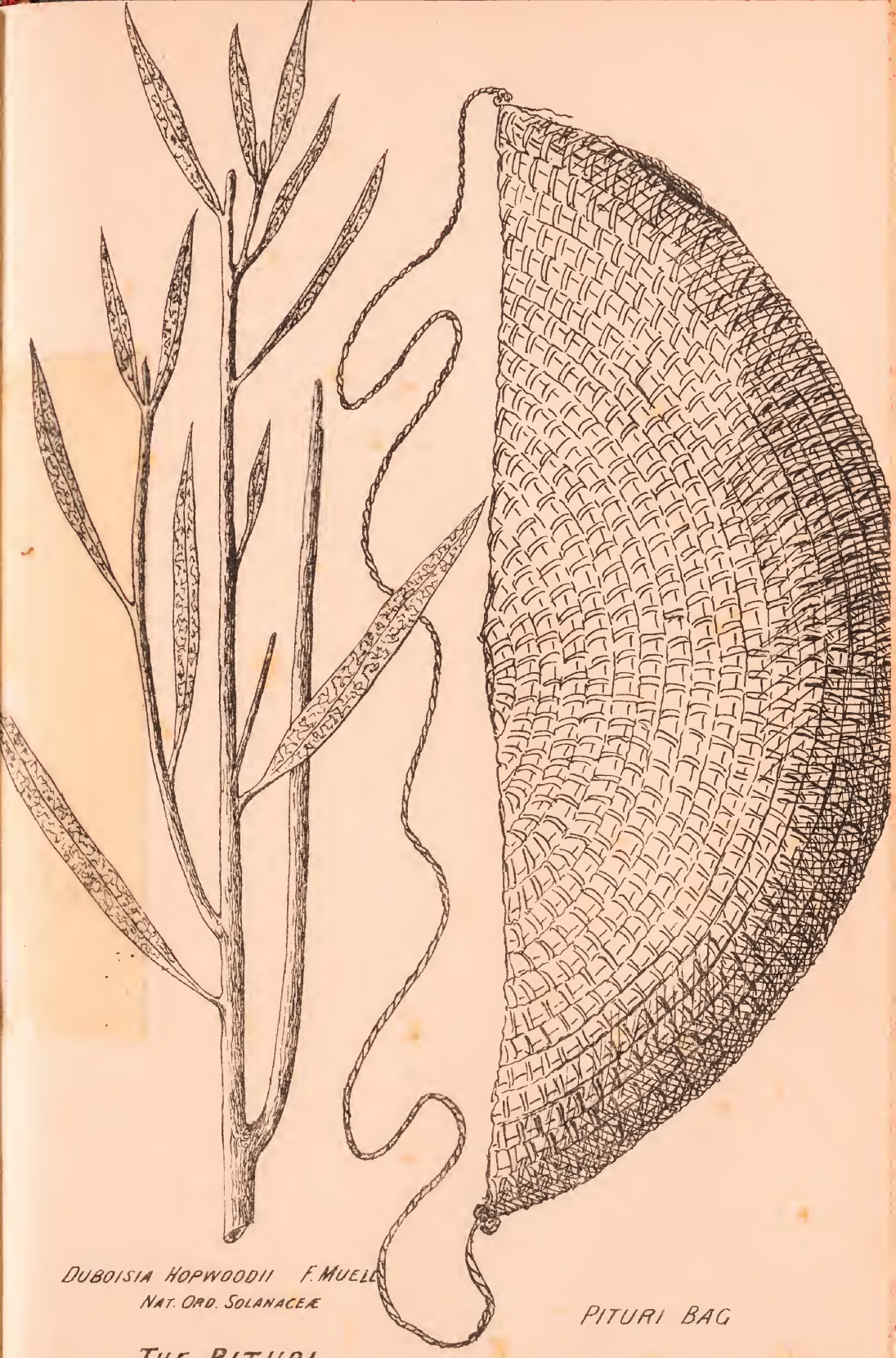

Duboisia Hopwoodii F. Muell.
Nat. Ord. Solanaceæ

Pituri Bag

The Pituri.