NOTES ON THE DISTRIBUTION AND VARIABILITY OF TASMANIAN LAND SHELLS.

By R. M. Johnston, F.L.S., &c.

[*Read May* 12, 1879.]

Having visited many parts of our island but little known to the general traveller, I have, during the past few years, accumulated materials with respect to the distribution and variability of our land and fresh-water shells, which may be helpful in removing some of the existing difficulties in regard to classification.

Mr. Legrand's very excellent monograph, modestly called by him "A Collection for a Monograph of Tasmanian Land Shells," contains a full description of 83 species. Of these the greater part (55) were described by the eminent Australian conchologist, Dr. Cox, whose monograph of the Australian land shells, a work of the greatest value, is necessary to every one who desires to become familiar with Australian conchology. The remainder is described by well-known leading naturalists as follows, viz., Brazier, 16; Pfeiffer, 8; Reeve, 1; Ferussac, 1; and Leach, 1. The work in addition contains notes and observations relating to distribution, variability, and affinities by Mr. Legrand himself, which are not the least valuable part of the work; and it is illustrated by two beautifully executed plates containing the enlarged drawings of 27 species.

Much, however, has been done since the last edition was published by Mr. Legrand eight years ago. At that time the only districts examined carefully were in the immediate neighbourhood of Hobart Town. True, there are references to habitats throughout the island, but these merely refer to such shells as from size or abundance would be picked up by casual observers. Of those who have since systematically investigated virgin districts after Mr. Legrand, Mr. Petterd deserves especial notice. His recent exhaustive contribution to the history of our land shells shows how much he deserves the thanks of all who interest themselves in the investigation of

our island fauna. In it he has added to the list about 30 species not embraced in Mr. Legrand's monograph, 4 of which were described by the Rev. J. E. Tenison-Woods, 17 by Mr. Petterd, 3 by Capt. Beddome, and one small but unique species by myself. Perhaps, however, the greatest credit is due to him for the effort to remove the difficulties, day by day on the increase, in connection with the existing classification. Many of the shells erected into specific distinction by Dr. Cox and others, require revision in the light of experience derived from the accumulation of large numbers of individuals, under various circumstances, and from many widely separated localities. Some of the species were described from single, or, at most, two or three individuals, and the extreme variability of certain forms has been the cause of confusion in that one or two varieties have been erected into specific distinction from immature specimens. As no one, however, can tell to what extent certain groups vary from one or two individuals, such mistakes are not only pardonable, but, if the descriptions are merely considered provisional, they are, historically, of the greatest advantage.

It was to be anticipated, therefore (indeed the authors state as much), that when other districts and a larger series of individuals were obtained, it might be necessary to reduce the number of species.

Until this was done it was impossible to say what were characters of specific value and what were not. It must not, therefore, be supposed that any reasons now adduced in support of the claims for a reduction of the number of species are intended to reflect upon the valuable work already done by those who had to do the best they could with scanty material. It is not an easy matter to tell what characters are of specific value and what are not even when the fullest information has been obtained as to the variability of the individuals of a group, and the greatest living authorities often come to different conclusions. It would be unreasonable, therefore, to expect, in the absence of the fullest knowledge respecting variation of size, colour, sculpture, distribution, that any author could determine, with accuracy, those characters which alone should entitle certain shells to specific rank. Of course I am aware of the difference of opinion which existed, and which even now exists in a more modified form, with respect to what constitutes a species and what a variety; but there is now, with few exceptions, sufficient agreement among the leading philosophical naturalists to leave little room for doubt in cases where the definition of a species is based upon the observation

of a large number of specimens from different localities. I do not use the word *species* as the type of a group of allied organisms which have a rigidly determinate number of immutable characteristics in common; for the characters which, as a whole, are relatively constant in those sections which we group under a specific name are themselves variable, and are frequently to be found interlapping other groups of merely relative constant characters, but which we yet acknowledge as belonging to a distinct species. From long and close observation Oscar Schmidt* concludes that he has gradually arrived at the "conviction that no reasonable dependence can be placed on any 'characteristic'; that with a certain constancy in microscopic constituents the outward bodily form, with its coarser distinctive marks, varies far beyond the limits of the so-called species and genera; and that with like external habits the internal particles, which we look upon as specific, are transformed into others, as it were, under our hands." There is, consequently, a firm conviction in the minds of leading naturalists "that no absolute species exists, and that species and varieties cannot be sharply separated." The old idea of the immutability of species is no longer tenable. Many still treasure up certain old test measures for the purpose of determining the affinity of a doubtful species--such, for example, as the fertility of certain crosses—fertility or non-fertility of hybrids. But such tests, in the light of modern experience, are unsatisfactory and often deceptive.

Darwin, Haeckel, and others have demonstrated the fallacy of trusting too much to such tests, and Schmidt writes:—"It is known that even in a state of freedom good species, such as the horse and ass, have been crossed for thousands of years. But hybrids, the produce of this intercourse, were supposed to be only exceptionally fertile, and, at any rate, not to produce fertile progeny for more than a few generations. On the other hand it was considered certain that the produce of crosses among varieties are fertile in unbroken succession. The dogma of the sterility of hybrids was formed without experimental or general observation, and by ill-luck was apparently confirmed by the most ancient and best known hybridization of the mule and hinny. To this familiar example, in which the fertility of hybrids proves abortive, we will oppose only one case of propagation successfully accomplished in recent times through many generations—that, namely, of hares and rabbits, two good species, never yet regarded as varieties." The same writer, after quoting

* "Doctrine of Descent and Darwinism, 1875."

striking examples from animals familiarly known, concludes that—"The cases of persistent fertility in hybrids are certainly not frequent, but they are, nevertheless, so well certified that the contrary statement is in plain contradiction to fact."

What, then, it may be asked, are we to abandon all idea of species? Certainly not. To do so would be to abandon all attempts at classification, for in degree, the same objection will apply to all sharply defined demarcations between genera, families, orders, classes, nay kingdoms. The expression that "no absolute species exists," merely lays stress upon the fact that the type of the group termed *species* is fixed upon mainly to define the maximum of relatively constant characteristics around which all the individual varieties may cluster, and which shall serve to distinguish the type species from a closely allied group of a similar character. Indeed we may picture species as the nodes of an irregularly moniliform series, whose extremities are in some cases sharp and distinct, and in other cases mere constrictions, where the extreme individuals of each node or group meet, and can hardly be distinguished from each other. But even when we clearly understand, and agree with each other as regards the principles which determine classification, it is often perplexing to fix upon characters whereupon to erect the standard of a species or variety, for it is well known in practice that characters are seized upon rather from stability and association with certain other characters than from absolute difference in particular features. Gwyn Jeffreys thus defines the degrees of difference which should determine species:—"They constitute more or less extensive groups of individuals which resemble each other as well as their parents and offspring to the same extent as we observe in the case of our own kind. These groups to deserve the name of species must be distinct from others: because, if any of them are so intimately blended together by intermediate links, so as to make the line of separation too critical, the test fails, and a subordinate group, or what is called a 'variety,' is the result. For this reason it is indispensably necessary to compare as great a number of individuals as possible, and especially a series of different ages and sizes, commencing *ab ovo*, as well as specimens collected from various localities." And again, he states in respect of what are termed varieties, that "the characters by which they usually differ from species consist of size, comparative proportions of different parts, colour, and degree of sculpture;" and he remarks that such differences "originate in some peculiarity of climate, situation, composition of soil or water which they inhabit, the nature or

supply of food, and various other conditions." These latter, he adds, may be "permanent or local." When permanent he calls them *races*, but, as he himself remarks, it would "be difficult" to discriminate between a *race* and a *species*.

Now all this accents, with authority, the statement made by me in a former paper *re* variability of fresh-water shells, and the necessity for reduction of species; and it clearly supports the course which Mr. Petterd has adopted with respect to the reduction of certain species of our land shells, and which all along has had my hearty concurrence.

The result of recent investigations of Tasmanian land and fresh-water shells, based upon a careful examination of large numbers of individuals, of all stages of growth, from widely separated localities, with varying local surroundings, geological and botanical; and taken from levels varying in some cases from 1 to 4000 feet, may be easily glanced at by passing in review certain well-known typical shells and grouping them with certain varieties which have hitherto been regarded as distinct species, but which according to the laws determined by the consent of leading naturalists, must now, I am of opinion, be considered simply as varieties of one species.

Helix Stephensi (Cox), is perhaps within given limits the most variable shell in Tasmania, in size, colour, elevation of spire, and sculpture. It is also the most widely distributed, and is found in varying degrees of abundance under different circumstances, from sea level to a height of 4000 feet. It seems to be as much at home in cold, sterile, upland regions, as in the lower and more genial districts; and I could not find that its distribution was in any way affected by the geological formations it was found upon, nor by the differences in vegetable surroundings.

An organism fitted to survive under such widely different circumstances may be expected to vary considerably. And this, in fact, is the case, for there are no less than ten species created out of minute differences in character, which are most unstable even in individuals from the same locality, and are trifling even in the most extreme members of the group. In sculpture there is a general agreement in the shell being markedly cancellate; and the form varies only to a trifling extent; but the sharpness and density of the striæ, the absence or presence of more or less regular and distant riblets, varies with the individual at different stages of its growth; hence it is not surprising to find all the characters of the ten species already referred to, melting insensibly into

each other, in the same or in different habitats. The shells thus related are, H. Stephensi (Cox); H. Du Cani (Cox); H. Kingi (Br.); H. plexus (Cox); H. Irvinæ; H. Savesi; H. Pascœi (Br.); H. Floodi (Br.); H. spoilata (Cox); H. scrupulus (Cox); H. cœpta (Cox).

Mr. Petterd still retains the first three as distinct species; but I question very much the propriety of retaining more than one, as they are undoubtedly all varieties of one species.

It is remarkable the close resemblance which the fossil H. Tasmaniensis, from the travertin beds at Geilston, bears to the group of which H. Stephensi is a member in certain characters, especially in peculiarities of sculpture. The latter group may be considered its living representatives, and it is of the greatest interest to find that this dominant and variable type should have such an extension in time as well as in space, for it is thus another illustration of the accuracy of Darwin's statement that "wide ranging, much diffused, and common species vary most."

H. Diemenensis (Cox). — The species which rivals H. Stephensi in range, number of individuals, and variability is H. Diemenensis, and it scarcely falls short of the former in the number of species which have been created from its most unstable features. It varies in size, and is found in every stage from pure white to pale brown, and with or without more or less regular bands of colour. It varies, too, in one of its chief characteristics, viz., the more or less sharply excavated umbilicus. Between these described species which are purely varieties, there are trifling differences, and these are bridged over by individuals whose variations insensibly melt into each other as in the varieties of H. Stephensi. It is found fossil, and gives the principal character to the Helicidæ sandstone of Barren and other islands of the Straits. The allied species which Mr. Petterd justly reduces to the rank of mere varieties are H. Thomsoni, H. Daveyensis, H. Atkinsoni, H. Camillæ, H. Wellingtonensis.

H. Sinclairi.—This beautiful shell is also a most variable species in degrees of depression, and especially in its colour and markings; and no one who has examined a large suite of specimens can have failed to notice the extreme variability of the latter. It, also, has a wide range, and is found from the margin of high sea level to an altitude of 2000 feet. It is also found fossil associated with four extinct species in the yellow limestone at Geilston Bay, and may therefore be considered the oldest known living

species of land shell in Tasmania. Three other species have been created from some of its varieties—H. dubitans, H. bombycina, and H. vexanda; but as there are links which insensibly connect them, they must also be reduced to the rank of varieties of H. Sinclairi, as suggested by Mr. Legrand and Mr. Petterd.

H. MacDonaldi (Cox).—Is a most abundant form, and has a very wide range. It is variable in size, form, density, and sharpness of striæ, and varies often from the prevailing form with its beautiful, regular, alternate bands of colour, by insensible degrees into a pure colourless variety. H. Juliformis, H. Gouldi, H. Kingstonensis, are merely varieties.

H. Stanleyensis (Petterd).—Varies in colour and band markings, in size, and in the density of striæ. It is allied to the former species, but there is a persistent characteristic difference in the sculpture of the nucleus. I am of opinion that Mr. Petterd's H. Tamarensis, which was originally discovered by me at the Rifle Butts, Launceston, is but an extreme variety of this variable shell. Hitherto it has been found near to the sea or some tidal river.

In the Helicidæ sandstone of the Bass Strait islands described by me in a former paper, I have discovered H. Stanleyensis in a fossil state associated with the fossil remains of H. Diemenensis, H. Pictilis, H. Furneauxensis, Vitrina, Verreauxi, Succinea Australis, and Bithynella nitida. The Helicidæ sandstone is of post tertiary age and of the same horizon as the raised sea beaches.

H. ruga (Cox).—Is a very interesting shell, and forms a link between H. Sinclairi and the fine shell H. lampra. The latter, however, though found abundantly, is not so widely distributed. It has only been found as yet in the northern portion of the island. H. ruga is very widely distributed. On Flinders Island it takes the place of H. lampra. It varies considerably in size, colour, and sculpture, and on this account I agree with Mr. Petterd in grouping H. questiosa (Cox), and H. Margatensis under it, as undoubtedly there are no specific characters to distinguish them from each other.

H. Fordei (Br.)—This shell is also most variable in size, colour, and sculpture, and I do not see how H. tabescens, H. Petterdi, H. Allporti, H. austrinus, H. medianus, and H. helice can be specifically separated from it. Their differences

TABLE showing the General Distribution of Tasmanian Land Shells, compiled from the Collections made at various times by W. Legrand, W. F. Petterd, Capt. Beddome, T. R. Atkinson, the Compiler, and others.

By ROBT. M. JOHNSTON.

Stanleyensis (P.) ...	...	*a*	*a*	*a*	...	*a*	...	*c*	...	...	...	...	...	...	*a*	*a*	...	*a*	...	*a*	...	...	G.
Savési (P.) ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*c*	...	...	...	...	...	...	N.W.
Tasmaniæ (C.) ...	...	...	...	...	...	...	...	*a*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	S.E.
tranquilla (C.) ...	...	...	...	...	...	...	...	...	*c*	...	...	...	*c*	...	...	...	...	...	...	...	...	...	S.
Trucanini (P.) ...	...	...	...	...	...	*a*	...	...	...	...	...	...	...	...	...	...	...	...	...	*a*	...	...	N.E.
trajectura (C.) ...	...	...	...	...	...	...	...	...	*c*	...	...	...	*c*	...	...	...	...	...	...	...	...	...	S.
Tamarensis (P.)...	...	...	...	...	...	*a*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	N.E.
Vitrinaformis (C.)	...	...	...	...	...	...	...	*c*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	S.E.
Wynyardensis (P.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*c*	...	...	N.W.
Weldii (T.W.) ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*a*	...	...	...	...	...	...	N.W.
BULIMUS—																							
Dufresni (Leach)	...	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*c*	*a*	*a*	*a*	*a*	...	G.
Tasmanicus (Pfr.)	...	...	...	*a*	...	...	...	...	*a*	*a*	...	...	*a*	*a*	...	...	...	...	...	...	...	?	Coast line.
VITRINA—																							
Milligani (Pfr.)...	...	...	...	...	...	...	...	...	...	...	...	...	...	*a*	...	...	...	...	...	...	...	...	W.
Verreauxi (Pfr.)	...	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	G.
fumosa (T.W.) ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*a*	*c*	...	...	...	...	...	N.W.
SUCCINEA—																							
Legrandi (C.) ...	...	...	...	*a*	...	...	...	*c*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	S.E.
australis (Pfr.)...	...	*a*	*a*	...	...	*a*	...	*a*	...	*a*	...	...	...	...	*a*	*a*	...	...	...	*a*	...	?	G.
TRUNCATELLA—																							
scalarina (C.) ...	...	*a*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*a*	Bass Straits
Tasmanica (T.W.)	...	*a*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*a*	Ditto
marginata (K.) ...	...	*a*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*a*	Ditto
micra (T.W.) ...	...	*a*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*a*	Ditto

a. common. *b.* not common. *c.* rare.

ABBREVIATIONS.—B., Beddome. Br., Brazier. C., Cox. P., Petterd. R.M.J., R. M. Johnston. T.W., Tenison-Woods. K., Kuster. G., Generally distributed throughout Tasmania.

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By ROBT. M. JOHNSTON.

		North-East.					South-East.					S.-West.		North-West.								
	Islands in Bass Straits.	Vic. Ringarooma.	Vic. Blue Tier.	Myrtle Bank and Ben Lomond.	Launceston.	St. Patrick's River.	Vic. Mt. Wellington, Huon River.	Vic. Recherche Bay.	Vic. Orford.	Vic. Hamilton.	Oatlands.	Vic. Port Davey.	Vic. Macquarie Harbr.	Vic. Pieman.	Vic. Circular Head.	Vic. Mt. Bischoff and Surrey Hills.	Vic. Table Cape and Emu Bay.	Vic. Gad's Hill & Middlesex Plains.	Vic. Leven and Torquay.	Chudleigh.	Australia.	
HELIX—																						
architectonica (Br.)				b			c															E.
antialba (B.)																a		a				N.W.
Bassi (Br.)							c															S.E.
Barrenensis (P.)	b													b	c							N.
bisulcata (Pfr.)																						Unknown
Bischoffensis (B.)														a		a		a				N.W.
cellaria (Muller)					a		a														a	E.
cæsus (C.)	a							a							a							G.
Collisi (Br.)					a		a															E.
Curaçoæ (Br.)							c	c														S.E.
Diemenensis (C.)	a	a	a	a	a	a	a	a				a	a	a	a	a	a	a	a	a		G.
derelicta (C.)					b		b								b							G.
dispar (Br.)							c									a				a		G.
Du Cani (C.)														a		a		a	a	a		N.W.
Dyeri (P.)					b									a		b				b		N.
Fordei (Br.)							c	a								c					c	S.E.; N.W
Furneauxensis (P.)	a														a		a		a			N.
Gunni (Br.)							c															S.E.
Gadensis (B.)														a		a		a				N.W.
Hamiltoni (C.)															a	b		b		b		N.W,
Hobarti (C.)			c		a		a								a					b	a	G.
Halli (C.)		a			a		a	a						a	a	a	a	a	a	a		G.
Henryana (P.)							c															S.E.
Hookeriana (R.M.J.)																c						N.W.
Jungermanniæ (P.)					a																	N.E.
Kingi (Br.)		a		a											a				a			N.
Kershawi (P.)					a	a									c			c				N., Gt. Lake
lampra (Pfr.)		a	a	a	a	a									a	c	a	a	a	a		N.
Launcestonensis (Reeve)		a	a	a		a																N.E.
Legrandi (C.)		a			a		a	a	a		a				a	b	a	b	a	a	a'	G.
lamproides (C.)															b							N.W.
Luckmani (Br.)					a		a										a					E.
limula (C.)			a	b	b										b	b	b	b		a		N.
Langleyana (Br.)													a									S.W.
Lottah (P.)					c																	N.E.
Morti (C.)					a		a								a		a		a		a	G.
mimosa (P.)					c		a									c				c		N.
marchianæ (C.)					a		b													c		G
M'Donaldi (C.)					a		c	a						a		a		a		a		G.
Mathinna (P.)					b																	N.E.
Nelsonensis (Br.)		?	?		a		c	a				c			c	c		c	a	c		G.
Officeri (C.)		c																				N.E.
Otwayensis (P.)														b		c						N.W.
parvissima (C.)					c		c									c		c				G.
positura (C.)								c								a					c	S.E.
plexus (C.)					a										a				a			N.
Petterdi (Br.)							c															S.E.
pictilis (T.)	a													a	a		a		a			N.
pulchella (Muller)							a															S.E.
questiosa (C.)											a									?	a	N.
ruga (C.)	b				a		a	b	a						b				c		a	G.
rotella (Br.)							c															S.E.
Roblini (P.)					c																a	N.E.
Sinclairi (Pfr.)					c		b	a					a	a	c	a	a		b	a		G.
subangulata (Pfr.)																						Unknown
sitiens (C.)							a															S.E.
Stephensi (C.)				a	a		a	a					a	a	a	a	a	a	a	a		G.
subrugosa (Br.)			c	a			c													a		G.
Spiceri (P.)		c					c									c						G.
Stanleyensis (P.)	a	a	a		a		c							a	a		a		a			G.
Savési (P.)															c							N.W.
Tasmaniæ (C.)							a															S.E.
tranquilla (C.)								c				c										S.
Trucanini (P.)					a														a			N.E.
trajectura (C.)								c				c										S.
Tamarensis (P.)					a																	N.E.
Vitrinaformis (C.)							c															S.E.
Wynyardensis (P.)																	c					N.W.
Weldii (T.W.)															a							N.W.
BULIMUS—																						
Dufresni (Leach)	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	c	a	a	a	a		G.
Tasmanicus (Pfr.)			a					a	a			a	a						a		?	Coast line
VITRINA—																						
Milligani (Pfr.)													a									W.
Verreauxi (Pfr.)	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	G.
fumosa (T.W.)															a	c						N.W.
SUCCINEA—																						
Legrandi (C.)			a				c															S.E.
australis (Pfr.)	a	a			a		a		a					a	a				a		?	G.
TRUNCATELLA—																						
scalarina (C.)	a																				a	Bass Straits
Tasmanica (T.W.)	a																				a	Ditto
marginata (K.)	a																				a	Ditto
micra (T.W.)	a																				a	Ditto

a, common. *b*, not common. *c*, rare.

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are purely varietal, and are insensibly blended together in different individuals.

H. Legrandi (Cox).—Varies considerably in size, colour, and sharpness and density of striæ. I have found some varieties pure white. Mr. Petterd from these considerations has reduced H. Ricei and H. Onslowi to varietal rank under this species.

The following groups are also most variable in either size, colour, or sculpture:—

Group 1.—H. Jungermanniæ, H. sitiens, H. Luckmani, H. Hobarti, H. Morti, H. Furneauxensis.

Group 2.—H. Halli, H. Spiceri, H. parvissima.

Group 3.—H. Bischoffensis, H. limula, H. Otwayensis.

Group 4.—H. Nelsonensis, H. Dyeri.

Group 5.—H. Kershawi, H. Gadensis.

In the neighbourhood of Mount Bischoff H. antialba is generally of a brownish colour; near Gad's Hill it is pure white.

Bulimus Dufresni (Leach).—This shell is noted for its extreme range of variability in shape, size, markings, and prevailing colour. The longitudinal bands of colour are its most persistent feature, but these vary considerably. The Rev. J. E. Tenison-Woods has written a most interesting paper, with special reference to the variability of this widely-distributed form. I think, however, that one of the variations of form figured by him is due to comparison between an immature and a fully-grown individual. In the young state the shell is more orbicular than in the mature stage. Comparisons in general form should be made between shells which have not less than five whorls. Five and a half whorls indicate greatest development.

These are the principal forms which are apt to puzzle the classifier in the absence of the necessary particulars as regards distribution and variability; and the expression of the views recorded in this paper, whether they meet with general concurrence or not, will, I hope, be serviceable even to those who may still try to adhere to the original classification where its divisions are most arbitrary and perplexing.

In regard to distribution I may state, as a general rule, that the most variable species are the most abundant, and appear to have the widest range in time and space.

The following tables refer to the distribution of all the

known forms of Tasmanian land shells, which are still retained by Mr. Petterd and myself as of specific value. As the south-western portion of the island has not yet been systematically investigated in any place, the absence of record from thence of wide-spread species may be taken as of no particular value.

On another occasion I intend drawing the attention of members to the distribution and variability of the fresh-water shells of Tasmania.

Shells widely distributed, and not confined to any particular district (22) :—Helix derelicta, H. Hobarti, H. Legrandi, H. Morti, H. Marchianæ, H. M'Donaldi, H. Nelsonensis, H. parvissima, H. pictilis, H. ruga, H. Sinclairi, H. Stephensi, H. subrugosa, H. Spiceri, H. Stanleyensis, H. Diemenensis, H. cœsus, H. Halli; Bulimus Dufresni, B. Tasmanicus; Vitrina Verreauxi; Succinea australis.

Shells hitherto found only in the N.E. district of Tasmania. —[Note.—The districts N.E., N. W., N., S., E., W., S.E., S.W., are determined by a meridian line drawn through Port Sorell (146 o) and 42 o parallel of latitude.]—(8) :—H. Jungermanniæ, H. Launcestonensis, H. Lottah, H. Mathinna, H. Officeri, H. Roblini, H. Trucanini, H. Tamarensis.

Shells hitherto found only in the S.E. district of Tasmania (12) :—Helix Bassi, H. Curaçoa, H. Gunni, H. Henryana, H. positura, H. Petterdi, H. pulchella, H. rotella, H. sitiens, H. Tasmaniæ, H. Vitrinaformis; Succinea Legrandi.

Shells hitherto found only in the N.W. district of Tasmania (12) :—Helix antialba, H. Bischoffensis, H. Du Cani, H. Gadensis, H. Hamiltoni, H. Hookeriana, H. lamproides, H. Otwayensis, H. Savesi, H. Wynyardensis, H. Weldi; Vitrina tumosa.

Shells hitherto found common to the two northern districts only (10) :—Helix Barrenensis, H. Dyeri, H. Furneauxensis, H. Kingi, H. Kershawi, H. lampra, H. limula, H. mimosa, H. plexus, H. pictilis.

Shells hitherto found common to the two eastern districts only (4) :—Helix cellaria, H. Collissi, H. Luckmani, H. architectonica.

Shells hitherto found common to the two southern districts only (2).— Helix tranquilla, H. trajectura.

Shells only found hitherto in two districts, S.E. and N.W. :—Helix Fordei, H. questiosa, H. dispar.

Shells reported from Tasmania but whose habitats are unknown :—Helix bisulcata, H. subangulata.

Shells common to other countries (10) :—Helix cellaria (E.), H. Fordei (A.), H. Morti (A.), H. pictilis (A.), H. pulchella (E.), H. Otwayensis (A.) H. ruga (A.), H. Stanleyensis (A.); Vitrina Verreauxi (A.); Succinea Australis (A.)

[Note.—A. Australia, E. Europe.]

Land shells discovered in a fossil state :—

Miocene—Helix Tasmaniensis (G. B. Sowerby)—Yellow limestone, Hobart Town; Helix Huxleyana, n.s. (mihi), ditto; Helix Geilstonensis, n.s. (mihi), ditto; Helix Sinclairi (Pfr.), Helix Simsoniana, (mihi), ditto; Bulimus Gunni, (G. B. Sowerby), ditto;

Post Tertiary—Helix Diemenensis, Helicidæ sandstone, Bass Strait; Helix Furneauxensis (Petterd) ditto; Helix pictilis (Tate), ditto; Helix Stanleyensis (Petterd), ditto; Succinea Australis (Fer.), ditto; Vitrina Verreauxi (Pfr.), ditto.