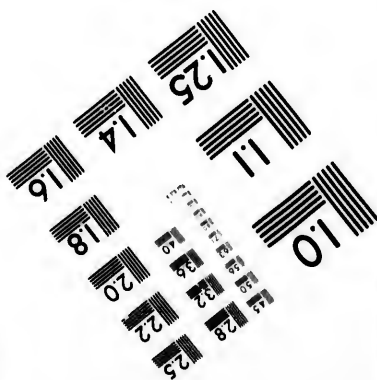
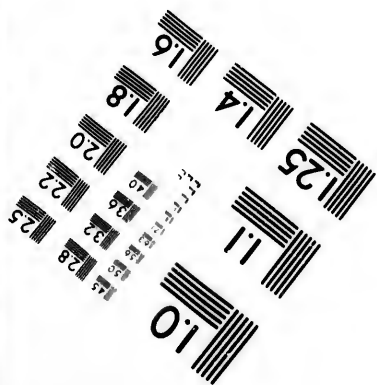
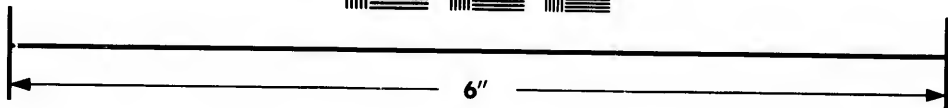
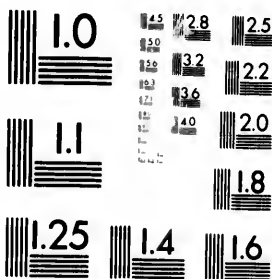


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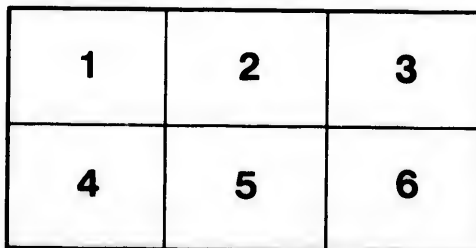
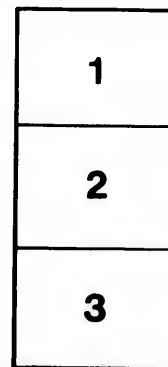
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*From the Transactions of the Nova Scotian Institute of Natural Science, Vol. VII.  
Part 4 (1889-90).*

JOHN ROBERT WILLIS,  
THE FIRST NOVA SCOTIAN CONCHOLOGIST.

A MEMORIAL.

HIS LIFE; HIS LIST OF SHELLS OF NOVA SCOTIA, AND  
HIS OTHER PUBLISHED WORKS.

Edited by W. F. GANONG, A. M.

INTRODUCTION.

It has been for some time past a source of much inconvenience and regret to some at least of the students of the Mollusca of Eastern Canada and New England, that the lists made by John Willis have been quite inaccessible. These lists have been frequently quoted by Gould, Stimpson, Dawson, Dall and others, and must form the basis for any future work of a similar character in this region. Yet they are not found in any of our large libraries, scientific or otherwise; neither the British Museum, nor those at Washington, at Philadelphia, at Boston, at Cambridge, at Ottawa, at St. John, nor at Halifax possess them, and so far as careful and systematic inquiries have been able to discover, there are but four or five copies of the principal list in existence, and all of them are the property of private individuals. There is no question as to its value, and the call for its preservation is imperative. Published as it was, privately and on a single large sheet, it was given to the world under conditions the worst possible for its preservation, and it is not surprising that it has been almost totally lost even from the carefully-guarded shelves of our largest libraries. Such lists can be sure of a permanent existence only in the pages of a regularly issued periodical of

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recognized standing, every number of which is jealously cared for by every good library receiving it. Nowhere could John Willis' list be so appropriately reproduced as in these volumes devoted to the Natural History of Nova Scotia, published in the city which reaped the benefits of all his life work, by the Institution of which he was one of the honored founders and first officers.

Moreover, it is not right that there should be lost to future students such records of the life and details of the personality of this man as may throw light upon his work or prove a stimulus to others. He may well be called the Father of Nova Scotian Conchology, and all Canadian students who have delight in this "fascinating science," as he himself calls it, must ever hold him in grateful remembrance.

These considerations have induced the Directors of this Institute and the editors of these notes to present the sketch of his life and his work and the reprint of his list, which are found herewith.

## I.

## JOHN ROBERT WILLIS.

BY HARRY PIERS.

JOHN ROBERT WILLIS was born in the city of Philadelphia, U. S. A., on 14th February, 1825. His parents were John and Dorothy Willis. The former came from Cavan, Ireland, and the latter was a native of Durham, England. From Philadelphia his father proceeded to Kingston, Canada, where he settled his family for a short time, and then finally removed to Halifax, N. S. Here, in the old National School, young Willis\* received his earliest education under the instruction of Abel S. Gore and his successor, James Maxwell. As a scholar he was diligent and ever ready for instruction. In 1846 a teacher was required to succeed Maxwell, and Willis was chosen to fill the position. He was thus transformed directly from a scholar into the principal of this important school†—no mean honour for one of his age.

About 1850 he turned his attention to the special study of our mollusca, and at the N. S. Industrial Exhibition, held four years later at Halifax, we find him gaining a prize for the best collection of native shells. He also obtained another for the finest case of insects. From this time he seems to have been deeply engaged in collecting. In 1855 he desired to exchange his specimens for others, and thereupon opened a correspondence with Professor S. F. Baird, of the Smithsonian Institution—a correspondence which was kept up for very many years and established a great friendship between these two naturalists. It was at Baird's request that Willis compiled one of his earliest publica-

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\*John had a younger brother named Edward, who was afterwards a member of the New Brunswick Government, and also well known as a journalist.

†The National School was then managed according to the principles of the Madras system of education, now fallen into disuse.

tions, a list of the birds of Nova Scotia,\* from notes made in 1852-5 by Lieutenants Blakiston and Bland.

By 1857 Willis had gathered an extensive collection of our shells, which he forwarded to Dr. A. A. Gould for examination and identification. In a similar way Dr. E. Foreman lent him a helping hand. Thus at various times we find boxes laden with precious shells being despatched to and from these naturalists for determination, examination or exchange. He also corresponded and exchanged with many other scientists, who seemed to be only too anxious for any information they might obtain regarding the natural history of our Province. Among these may be mentioned Dr. Wm. Stimpson, Dr. P. P. Carpenter, Sir J. W. Dawson, Sir Wm. Denison (Governor of Madras), Professor John Capellini (of the University of Bologna, Italy), Hon. Rawson Rawson (of the West Indies), Dr. C. J. Cleborne, Prof. E. D. Cope, and many others. It was in 1857 that his first known list of Nova Scotia shells was published.

Willis gave to the museum of King's College, Windsor, a large collection of native shells, consisting of about 123 named and 124 unnamed specimens. To this he added in after years. He presented a similar collection to Acadia College, Wolfville. His gifts, however, were not confined to conchology alone, for we find him repeatedly quoted as a donor of various articles to these and other institutions.

In 1859 he sent a box of Nova Scotian shells to the Smithsonian Institution where they were to be compared by P. P. Carpenter and W. Stimpson with the types in the museum of that Institution, and labelled accordingly. In reference to these shells Stimpson, in a letter to Willis, says: "I have as yet had time only to look them over in a general way, but I assure you even this cursory examination has convinced me that you have done a great service to our noble science, by discovering several shells on our coast which had escaped us all, thereby enriching our fauna and extending the geographical range of North European species." He adds a list containing nine species new to this coast and remarks: "There! If that starts your enthusiasm as it does

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\*See Bibliography on a later page, No. 2.



mine I have no fears that the conchological fauna of Nova Scotia will not be soon and well worked up." Mr. W. G. Binney and Dr. E. Foreman undertook the examination of the land and fresh-water species. Other boxes of shells were sent at various times to the Institution, a part to be kept, and the rest returned after examination.

The British Museum is indebted to him for a large collection of our shells which he presented in 1861, while the Boston Society of Natural History and the Philadelphia Academy of Natural Sciences, also received numerous specimens from his cabinet. He sent a fine set of Nova Scotian edible mollusca and pearls to the International Exhibition of 1861. For these he received honourable mention. A similar collection was forwarded to the Dublin Exhibition of 1865. He presented a large collection to the Smithsonian in 1863, the greater part of which, including all the small and critical species, was loaned to Stimpson for study, and was lost in the great Chicago fire of 1871.

Meanwhile his educational work was going steadily forward, and he was fast gaining fame as a thorough and painstaking teacher. In 1856 military drill was introduced and practiced in the National School, through the efforts of Willis and his friend, Dr. Charles Cogswell. Other schools adopted the novel and beneficial system, and four years later it was introduced into England and became very popular. Halifax, therefore, has the honour of taking the lead in this salutary movement, not only on this continent, but in Great Britain also.

Willis was one of those who were present at the formation of the Nova Scotian Institute of Natural Science in 1862, and he was elected its first Corresponding Secretary. During the same year he read a lengthy paper before the Nova Scotian Literary and Scientific Society (Halifax). It treated mainly of the edible mollusca of our Province, but a complete catalogue of Nova Scotian shells was also attached.\* This paper was intended for the Smithsonian Institution, and Baird proposed to insert it in the Report. For some unaccountable reason, however, Willis did

\*At this time Willis' collection is said to have consisted of over 8,000 distinct native and foreign varieties, embracing examples of most of the species then known to naturalists. It is doubtful whether there was a finer collection in this department throughout British America.

not take advantage of this offer, but published it instead, under the title "Our Edible Mollusca," in an obscure local periodical called the *Colonial Review*. With the exception of the list of species, Mr. T. F. Knight quotes this article almost entire in one of his pamphlets on the fisheries of Nova Scotia.\*

Willis' worth was now being acknowledged abroad. In 1862 he was unanimously elected a corresponding member of the Liverpool (G. B.) Natural History and Microscopical Society; and in the following year he received the same honour from the Boston Society of Natural History.

In November, 1863,† he issued a privately printed list of Nova Scotian shells, his most important published work, which is reprinted in the present volume.

In 1863 an Industrial School was started in Halifax, and in the following year Willis was appointed to superintend the institution. On April 18th he formally resigned his position in the National School, much to the regret of those in charge. He was unquestionably an efficient and successful teacher. His school was described as being a model of good order and discipline, and his treatment of his pupils such as was intended to secure their confidence and respect. It was his honest boast that not one of his scholars had been known to turn out in a manner that would reflect discredit on his teacher. They ever entertained for him a warm affection, which in days of adversity was like a gleam of sunshine to his soul.

Sir J. W. Dawson had long exchanged and corresponded with Willis, and was his warm personal friend, and in 1864 he named a new species of Polyzoan in his honour—*Gemellaria Willisii*.‡

Willis was mentioned in connection with Dr. D. Honeyman as being well suited to take charge of a Provincial Museum, should one be founded in Halifax. These two gentlemen in 1865 || pre-

\* Descriptive Catalogue of the Fishes of Nova Scotia. Halifax, 1866, pp. 43-53. See Bibliography on a later page, No. 4.

† At this time Willis says there were several of his collections of Nova Scotian shells—one in the Smithsonian Institute; one in King's College Museum, Windsor; one in Acadia College, Wolfville; and one in his own possession; and also the remains of what was once a good collection in Dalhousie College, Halifax, presented by him many years before.

‡ See full description in *Trans. of N. S. Institute of Natural Science*, vol. I., part 3, p. 3. Sir William Dawson tells us that Dr. Hinks regards it as a variety of *G. loricata* of Europe, but it is a very marked varietal form.

|| Four years previously the Rev. Mr. J. Ambrose and Mr. J. M. Jones had suggested to Willis the propriety of taking some steps in the matter, and the first-named gentleman had sent a communication upon the subject to "tune" the newspapers, as he termed it.

sented a memorial to the Government strongly advocating the establishment of such an institution, and Willis appeared personally before a committee which was to report upon the matter. Out of this movement grew the present Provincial Museum of Nova Scotia.

Having done good service in the Industrial School, Willis was appointed, in 1865, secretary of the newly-formed Board of School Commissioners for the City of Halifax. A year or so after this he was elected a corresponding member of the Academy of Natural Sciences of Philadelphia.

In 1875 he retired from his position on the school board, which he had occupied for ten years. From this time he was without an appointment and in poor circumstances. Finally, he was forced to part with the collection \* which he had made with such care, and which represented the result of many years patient and unremitting labor. This almost broke his heart, and when the precious specimens left his house he wept like a child.

During the following year (1876) he was taken ill, and died on March 31st. He was buried in the Camp Hill Cemetery.

Mr. Willis was twice married. His first wife was Mary Anne, daughter of Wm. H. Artz, by whom he had three sons and three daughters. Of these, one son and two daughters are still living. Mrs. Willis died in 1865. He married secondly Eliza Moseley, and they have had two sons and two daughters, of whom one daughter is dead. His second wife is still residing in Halifax.

In character Willis was eccentric. His great enthusiasm, however, made up to a large extent for this short-coming, and enabled him to persevere in most of his undertakings. It is said that on one occasion Mr. Hutton, formerly gardner to the Horticultural Society, possessed a century plant which was about to bloom. Willis, hearing of this, sat up patiently for two nights in order that he might witness the unfolding of the curious blossom. To his friends he was good and true. Being of a merry disposition, he was constantly interspersing his quick, animated.

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\* A great part of it still remains in Halifax, and is now the property of Mr. W. D. Harrington and Mr. E. J. Loydley.

talk with many a jolly laugh, which showed that even care could not altogether dampen his jovial spirits. He was an ardent conchologist, entomologist, floriculturist, and mineralogist, and it has been remarked of him that he added to a great store of knowledge a simple and unassuming nature, which perhaps stood more in the way of his prosperity than anything else—for the busy world crowds out the possessors of such qualities.

His conchological operations were carried on chiefly in the vicinity of Halifax. The "Harbour," Bedford Basin, Eastern Passage, and many of the outlying bays and inlets were constantly visited by his dredge, while fresh water ponds and streams were also duly ransacked and made to contribute to his growing cabinet. Whatever spare time he had, was thus spent in pursuit of his favorite study. He also made regular visits to the fish-markets, where he examined the contents of fish stomachs—those rich treasuries to the shell-collector. He left no field unsearched which could yield anything in his line of work, and this enthusiastic thoroughness was one of the marked features of his character. All who knew him speak of this, and of his amiability and quiet generosity.

## II.

BIBLIOGRAPHICAL AND CRITICAL NOTICE  
OF WILLIS' PUBLISHED PAPERS.

The Publications of John Willis were not numerous, and so far as they are known to the editor they are as follows, arranged chronologically :

(1). 1857 (?). [A list of Shells of Nova Scotia, with explanatory letter.] *Church Record* (?), Halifax (?), Oct. 17, 1857, (?).

THE only copy known to us of this interesting list, which as the citation below shows, was the first written by Willis, is owned by Mr. W. H. Dall, of Washington, to whom we are indebted for the opportunity of examining it. It is a clipping from a newspaper and has the date given above (Oct. 17, 1857) written in ink clearly upon it. It is unfortunately torn irregularly across the top so as to partly obliterate the printed name of the paper in which it appeared. But the words "FOR THE CHURCH" can be clearly seen, with some fragments of letters following, from which Mr. Piers has surmised that the paper was the "Church Record," a paper published about that time in Halifax. Mr. Piers has found several clippings among Mr. Willis' papers which were taken from the "Church Record" acknowledging donations made by him to King's College, etc., so it seems quite certain that Mr. Piers' surmise expresses the truth. We have no reason to believe that the written date is not the correct one, and the shortness of the list compared with later ones proves that it is much earlier than these of 1862 and 1863.

The list gives generic and specific names only, arranged alphabetically, with no localities. It includes ninety-one species, some of which are shelled Crustacea or Echinodermata. It contains many misprints. It is signed "John R. Willis, National School, Halifax," and is preceded by a short letter which is so characteristic of the man that we reproduce it entire :

"MR. EDITOR,—With you [*sic*] kind permission, I avail myself of the columns of your useful journal to publish a list of Testaceous Mollusca of Nova Scotia, collected by me up to the present time. I did not intend doing so until my collection, already pretty extensive, was completed, and I am now only induced to alter my plans, that I may not give offence to many impatient friends and correspondents, to whose opinion due reference should be paid—and who are anxious to know how much or how little Nova Scotia can produce in the conchological field. As many of the genera are but thinly represented in this Province, instead of classifying, I have merely arranged them, for the sake of reference, in alphabetical order, premising, of course, that many of your readers have some knowledge of the fascinating science of shells.

I will be pleased to give the localities, depths of water, &c., where any specimen can be procured, to any correspondent who may think proper to address me a *post-paid* communication on the subject. The name of any specimen marked \* is new to the Province."

(2). 1859. List of Birds of Nova Scotia. Compiled from notes by Lieutenant Blakiston, R. A., and Lieutenant Bland, R. E., made in 1852-1855, by Professor J. R. Willis, of Halifax. *Smithsonian Annual Report for 1858*. Washington, 1859, pp. 280-286.

An annotated list of species containing occasional comments signed "J. R. W." It is the only publication of his known to us which does not deal with Mollusca. A "List of the Birds of Bermuda," by Lieut. Bland, R. E., in the same volume (pp. 286-289) is said to be "communicated by John R. Willis."

(3). 1862. Catalogue of the Marine Shells of Nova Scotia. By T. R. Willis (*sic*), of Halifax. *Proceedings Boston Society of Natural History*, VIII., 1862, pp. 61-62.

This list was read before the Society in January, 1861. It is a list of names only, and gives only Marine Mollusca, of which 129 species are enumerated. As far as it goes it is very like the list in the *Colonial Review* described below (No. 4), like it including two species of *Cellularia* (a Polyzoan), and like it omitting several species to be found in his latest list (No. 5). Further comment on this is not called for; it is easily accessible

in the proceedings of the Society. Its lack of localities greatly lessens its value.

(4). 1862. Our Edible Mollusca. *Colonial Review*, Halifax, Nov. 29th, 1862, and the three following numbers.

Only a single copy of this list is known to be extant, and that is in the possession of Mrs. John Willis, of Halifax. Its rather curious history has been carefully studied out by Mr. Piers. In March 1852, Professor Baird asked Willis to send him the MSS. of the article on Edible Mollusca for publication, a request which he repeated in June. In April of the same year Willis read it before the N. S. Literary and Scientific Society. "previous to its transmission to the Smithsonian." But it apparently was never sent, for it does not appear in the Smithsonian publications, but was published in November in the *Colonial Review*. This journal, as Mr. Piers has discovered after much careful inquiry, was published in Halifax and suffered an early demise after the issue of only half a dozen numbers. It was a four columned (10x11½ inch) paper whose editor was known only by his *nom de plume*, and the place of publication of which was not generally known.

Three numbers contain the interesting paper on Nova Scotian Economic Mollusca, while the fourth contained a complete list of all known Nova Scotian shells. The date of the first issue alone is known to us, those of the other three not appearing on Mrs. Willis' copy. The first three articles, with the exception of a single paragraph and one or two sentences, were reprinted word for word in Thomas F. Knight's "Descriptive Catalogue of the Fishes of Nova Scotia" (Halifax, 1866, pp. 43-53), a work which is easily accessible. This was an admirable statement of the value of Nova Scotian Mollusca to man, and has been freely quoted and its substantial assistance acknowledged in a late work on the "Economic Mollusca of Acadia," published by the New Brunswick Natural History Society.

The fourth number contained a list of Nova Scotian shells. Mr. Piers tells us that this was very like his latest list, which is reprinted below. It included only two names which are not in the latter, which are *Cellularia fastigiata*, Blum., and *Cellularia turrita*, Desor, two Polyzoans. With these exceptions

everything in the *Colonial Review* list is in the list below, and the latter includes ten names not in the former, *i. e.*, Nos. 4, 55, 57, 78, 87, 158, 196, 199, 200, 201, of the following list. It therefore included 193 names, a large advance over the 1857 list, which included 91. Further comment on this list is needless, since its substance is embodied in the one below. It has probably been seen by very few naturalists.

Another list of Economic Mollusca of Nova Scotia, which was probably written by Willis, appeared in the Catalogue of the Nova Scotian Department of the International Exhibition of 1862 (Halifax, 1862, p. 13). The list includes 18 species, with notes on their abundance, and it is stated that they are to be furnished by J. R. Willis.

(5). 1863. Nova Scotia Shells. *Privately printed list, issued in November, 1863.*

This is Willis' latest, longest, and in all ways most important list of Nova Scotian Molluscs, and it is reproduced in full, word for word, below. It was printed on a single sheet, 14x8 inches in size, with the introductory notes printed across the top of the entire sheet and the list itself arranged in three columns. Mr. Piers has found amongst Willis' correspondence, now in possession of Mrs. Willis in Halifax, several newspaper clippings and letters of acknowledgment from various persons to whom the list was sent, the dates of which make it certain that it was issued in November, 1863. It is this list which has been quoted by various writers. As Mr. Piers suggests, he appears to have taken his *Colonial Review* list (No. 4), and having struck out two names, to have added some others with additional notes on distribution, etc., and to have published this as the list we are now considering.

As already referred to, the list is now very rare, no large libraries owning copies. The only copies known to us are those belonging to Mrs. Willis of Halifax, to Sir William Dawson, to Mr. Dall of Washington, and to the editor of these notes, into whose hands it came from the library of the late J. Matthew Jones, as the gift of the son of the latter. Each of these copies has pen and ink corrections of misprints, etc., by Willis himself, none of which are important.



That all the facts contained in it are reliable we have not the slightest doubt. Not only was Willis an exceedingly careful man, but he had the advantage of constant correspondence with Stimpson and Gould, Foreman and Binney, and these men determined for him his doubtful species. They had themselves confidence in him, as shown by their frequent citations of facts on his authority, Stimpson especially, having quoted him frequently in his unpublished work on Northeast American Molluscs. Gould, in his splendid work on the Invertebrates of Mass. (2nd ed.) constantly quotes Willis, and Sir William Dawson does also in his works on the Post-Pleocene Geology of Canada. We can have no better proof of the reliability of his work than is shown by the confidence reposed in him by his contemporaries.

The value of his list must consist chiefly in the fact that it was the first detailed list of Nova Scotian Mollusca which gives exact localities, range, and relative abundance; and this means more than appears on the surface, for not only has it enabled American naturalists to extend the range of species on our coast, and therefore has helped to wider and more accurate generalizations, but it preserves a record tolerably complete and accurate, as far as it goes, of distribution of forms at that period. The fauna of this region is not stable, but is constantly changing, and a century from now some of the forms will have a range very different from that described by Willis, and the Zoologists of that date will thank him for having preserved a precious record for them. He was the first man to point out the occurrence of Southern forms upon our coast, in the Gulf of St. Lawrence, and on Sable Island, living surrounded by cold-water forms, far north of their proper home, which is to the south of Cape Cod. Sir William Dawson had discovered these facts, it should be said, as soon as had Willis, or sooner, but Willis was the first to publish them. This subject has attracted the attention of later students, including Professor Verrill, Sir William Dawson, and the present writer, and all of them have found Willis' discoveries, as embodied in his list, of the highest value.

(6). 1863. On the Occurrence of *Littorina Littorea* on the

Coast of Nova Scotia. *Transactions Nova Scotian Institute*, vol. I., 1863, pp. 88-90.

In this paper Willis describes his discovery of the occurrence of this European species on the shores of Nova Scotia, and gives the facts then known to him as to its distribution. He found it pretty widely scattered in Nova Scotia, and inclined to the opinion that it is indigenous. This was not, however, his first announcement of his discovery, for in the proceedings of the Philadelphia Academy for 1860, p. 148, occurs a note in which it is stated that he announces the discovery of this species, along with a European Brachiopod, in Nova Scotian waters, and he had, moreover, included it in the earlier "Church Record" list described above (No. 1).

But the paper under consideration was the first of a number of papers on and references to the subject, the chief of which are those by Professor Verrill in *American Journal of Science*, Vol. IV, 1874, p. 133, and again in the same, Vol. XX. p. 251; by A. F. Gray in *Science News* for 1879; by Professor E. S. Morse in *Bulletin of the Essex Institute*, Vol. XII, 1880, pp. 171-176; and by W. F. Ganong in *American Naturalist*, Vol. XX, 1886, pp. 931-940 and Vol. XXI pp. 287-288. It cannot be said that the question as to whether this species be native or introduced is yet settled, for though the weight of evidence and opinion points to the latter conclusion, some others whose opinion in such matters is of high value, hold the contrary view. But Willis undoubtedly is entitled to the credit of being the first to announce the discovery of this species in America, though its presence in the Gulf of St. Lawrence was observed by Sir William Dawson about the same time that Willis found it near Halifax.

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In estimating John Willis' position among naturalists, and his services to science, it must be remembered that the circumstances of his early life and surroundings were not such as to develop a naturalist of broad training and sympathies. Under different circumstances, the tastes and perseverance which found vent in enthusiastic collecting and careful classifying might have

fitted him for wide knowledge and deep research. It is as a careful, persevering, and discriminating collector in a limited field that he rendered service to conchology. It cannot be said that he added anything of importance to science as a whole, facts of distribution within limited areas hardly deserving such a rank, but, content to work a limited field, he drew from it all it had to offer him and freely shared its fruits with all who cared to share them. Others saw better than he the significance of the facts he collected, and made the proper use of them. Such work as his is needed by science, and the man is a benefactor who does it well, no matter how limited his field may be, and the moral effect of work well done is as wholesome in science as it is in other affairs.

Willis was a naturalist of an old, but happily not yet extinct type, one who loved nature for her own beautiful sake and not as those who make her works playthings for their delicate anatomical tools and an excuse for their own self-glorification. Such men as Willis have a distinct value, and they are too rare in these days of much closet-work. They cannot do much as a rule to add to science, but they do much to utilize its advances and translate its necessary technicalities into pleasant knowledge for themselves and others.

Such was John Willis, a man whose name will not be found among those which mark the line of scientific advance, but one who made the most of what circumstances allowed him and who gave to the world the best that the limited field in which he worked was capable of yielding.

## III.

WILLIS' LIST OF NOVA SCOTIAN SHELLS,  
1863.

The following list, which has been described in the preceding bibliography (No. 5), is re printed as nearly like the original as possible, even mis-prints being retained, and without explanation where they are not misleading. No attempt has been made in editing it, to correct the synonymy except where it is very misleading, or to add any information except where such is contained in other papers by Willis. Comments on localities are added, not when the range has been extended by later researches, but only where these researches seem to show that the list is in error. It is in a word a re-print of John Willis' list, and we have not attempted to make it a modern list of Nova Scotian Mollusca. The editor is of course responsible for all of the footnotes.

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**Nova Scotia Shells: By John Robert Willis, Principal N. School, Halifax, Nova Scotia.**

The following Catalogue of a collection of the MARINE, LAND and FRESHWATER SHELLS of Nova Scotia Mollusca, which I presented a short time ago to the Smithsonian Institute, Washington, D. C., embraces all the species which I have been enabled to collect during many years study and labour, up to 1862.

I am greatly indebted for specimens to Prof. J. W. DAWSON, F. R. S., Montreal; to Dr. J. BERNARD GILPIN, Halifax; THOS. BELT, Esq.; P. S. DODD, Esq., Sup'tdt Sable Island; Rev. J. AMBROSE, M. A., St. Margaret's Bay; Mr. JAS. FARQUHAR, Sable Island, and some other kind friends. I am also under grave obligations to Dr. A. A. GOULD, Boston, Prof. STIMPSON, Cambridge and Dr.

E. FORMAN, late of the Smithsonian Institute, for identifying obscure specimens for me.

It will afford me much pleasure to supply any information relative to the habitats, and mode of collecting any of the species I have been enabled to secure, so far as my experience and limited acquaintance with the fascinating science of Conchology will warrant.

From an examination of the Catalogue it will be seen that the *Serpula* and *Vermetes* are missing therefrom—though I have a number of species on hand, I have as yet been unable, from press of other matters, to turn my attention to these beautiful and interesting classes.

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PALIOBRANCHIATA.\*

*Rhynchonella psittacea*, † GM. Banks of St. Margaret's Bay, &c.  
*Waldheimia cranium*, † MULL. Banks of St. Margaret's Bay, &c.;  
 very rare.

*Terebratulina septentrionalis*, COUTH. Halifax Harbor, &c.;  
 common.

*Terebratula Labradorensis*. *Stimpson Fishery Banks Rare.* ‡

LAMELIBRANCHIATA.

*Anomia Ehippium*, LIN. From the wreck of the frigate "Tri-  
 bune," lost off Herring Cove, about 70 years ago; speci-  
 mens procured by a diver; not rare.

*Anomia Aculeata*, GM. Parasitic on lobsters, &c.; common. Vars.  
*Squamula et Electrica.*

*Ostrea Virginiana*, LISTER. Wallace, Tracadie, Mabou,  
 &c.; abundant. } Perhaps  
*Ostrea Borealis*, Lam. Tatamagouche, &c.; abun- } syn.  
 dant. §

*Lima Sulculus*, LEACH. Sambro Bank, Sable Island Bank;  
 very rare. ||

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\* These divisions are crossed out by Willis in some of his lists.

† Sara, in his splendid *Mollusca Regionis Arcticae Norvegiae* gives both of these as occurring on the north-east coast of America. Did he take Willis' authority for it?

‡ These words are added to the list in Willis' handwriting.

§ Shells of this species, or rather, variety, are said to have been found at Sable Island. A. L. Adams, "Field and Forest Rambles," p. 35.

|| Has not been found elsewhere in American waters. Binney, in his edition of "Gould's Invertebrata of Mass.," 1870, p. 200, appears to accept the identification of the species as correct.

- Pecten Magellanicus*, LAM. Sable Island, Mahone Bay, Lunenburg, &c.; common.
- Pecten Islandicus*, CH. Halifax Harbor, St. Margaret's Bay, Sable Island, &c.; common.
- Pecten Concentricus*, SAY. Sable Island only. \*
- Nucula Tenuis*, MONT. Sambro Banks, &c.; com.
- Nucula delphinodonta*, MICH. Fishery Banks; rare.
- Nucula proxima*, SAY. Do. do.
- Yoldia pygmaea*, † MUNCEY. Do. do.
- Yoldia thracieformis*, STOKER. Do. do.
- Yoldia sapotilla*, GOULD. Do. com.
- Yoldia limatula*, SAY. Do. do.
- Yoldia Myalis*, COUTH. Do. do.
- Leda tenuisulcata*, COUTH. Do. do.
- Leda Minuta*, MULL. Do. rare.
- Modiolaria substriata*, † GRAY. Halifax Harbor; do.
- Modiolaria nigra*, GRAY. Do. do.
- Modiolaria discors*, LIN. Sambro Bank; not uncommon.
- Modiolaria corrugata*, STM. Sable Island; rare.
- Modiola plicatula*, LAM. Wallace, Tracadie, Sable Island, Pictou, &c.; not scarce.
- Modiola vulgaris*, § FLEMING. Whole coast; com.
- Mytilus edulis*, LIN. Do. do.
- Unio complanatus*, LEA. Common to most lakes in Nova Scotia.
- Unio radiata*, LAM. Grand Lake, on line of Nova Scotia Railroad; not common.
- Unio* ———, (?) Dartmouth Lakes, perhaps new to Nova Scotia.  
J. R. W.
- Anodonta Ferussaciana*, || (?) Dartmouth Lakes; common.
- Anodonta Implicata*. Lakes on line of Railroad; rare.
- Anodonta* ——— (?). Two varieties, from Prof. McCULLOCH, probably new to Nova Scotia; St. Mary's River, Truro.

\* Either this species, or the preceding, probably this, occurs in the shallower parts of the Gulf of St. Lawrence. See Bull. Nat. Hist. Soc., N. B., No. VIII., pp. 68, 69.

† *Leda pygmaea*. A European species, not yet reported elsewhere in American waters except by Jeffreys (Brit. Conch. V., p. 173), who gives Scandinavia and Malne.

‡ *Montacuta substriata*, Mont. It has not been reported from American waters by any other writer.

§ *M. modiolus*.

|| Undoubtedly some other species. Lea (Obs. genus Unio., X., p. 87), gives this species only from the Ohio Valley.

- Alasmodonta margaritifera*. Rivers in Annapolis; Sackville River also; pearl producing.
- Cyclas Partumeia*, SAY. Nearly all of the N. S. Lakes; common.
- Cyclas similis*, SAY. St. Mary's River, Truro, from Prof. McCULLOCH, Truro.
- Pisidium dubium*. Dartmouth Lakes, &c.
- Thyasira Gouldii*, ST. (?) Whole coast; common.
- Serripes Groenlandicus*, \* CH. St. Margaret's Bay, Bedford Basin; rare.
- Cryptodon Gouldii*, PHIL. †
- Cyprina Islandica*, LIN. Whole coast; common.
- Astarte Striata*, LEACH. † Fishing banks; rare.
- Astarte semisulcata*, LEACH. Do. common.
- Astarte crebricostata*, FORBES. Do. do.
- Astarte lactea*, BR. & SOW. §
- Astarte castanea*, SAY. Halifax Harbor; common.
- Astarte elliptica*. N. S. (?); doubtful.
- Cardita Borealis*, CON. Fishing banks; common.
- Cardium Islandicum*. Bedford Basin, Halifax; rare.
- Cardium pinnulatum*, CON. Fishing banks.
- Cardium edule*, CON. Fishing banks; rare, young only; doubtful species. ||
- Mercenaria violacea*, ¶ SCHUM. Wallace, Tracadie, Sable Island; common.
- Kellia Rubra*, GOULD. Sable Island, &c.; common.
- Gemma Tottenii*, STM. Fishing banks; rare.
- Turtonia Minuta*, F. ET H. Sable Island; common.
- Callista covexa*, SAY. Sable Island; rare.
- Tapes fluctuosa*, GOULD. Fishing banks; rare.
- Mactra gigantea*,\* \* (?) GOULD. Sable Island; com.

\* *Cardium Groenlandicum*.

† The same species as *Thyasira Gouldii* above, though *Cryptodon Gouldii* is the proper name. Its repetition in the list must have been an oversight.

‡ *Astarte compressa*, according to Jeffreys (Brit. Conch. II., 316 and V. 183), occurs on north-eastern coast of America.

§ Now considered a synonym for *A. semisulcata*.

|| The presence of *C. edule* in American waters has not been confirmed. This was almost certainly the young of another species, probably of *C. Islandicum*.

¶ *Yenus mercenaria*.

\*\* In his account of the "Edible Mollusca of Nova Scotia" (reprinted in Knight's Deser. Catalogue of the Fishes of N. S.), Willis shows us clearly by his description of their size and shape, that by *M. gigantea* he meant what is now called *M. solidissima*, and by *M. solidissima* he meant our *M. ovalis*.

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r size and  
solidissima
- Mactra solidissima*,\* (?) CHEMN. All of Nova Scotia sand beaches: common.
- Ceronia arctata*, CON. Fishing banks, Sable Island; rare.
- Ceronia deaurata*, TURK. Do. do.
- Tellina Fusca*,† PHIL. Whole coast; common.
- Tellina proxima*,† BROWN. Fishing banks; scarce.
- Tellina tenera*, SAY. Fishing banks; scarce.
- Macoma subulosa*,‡ SPENGL. Do. rare.
- Macoma fragilis*,‡ O. FABR. Do. do.
- Solen Ensis*, LIN.§ All of Nova Scotia sand beaches, Sable Island; common.
- Machæra Squama*, BLAMR. Fishing banks; rare.
- Solenomya velum*, SAY. Fishing banks; very rare, have only fragments to identify by.
- Solenomya borealis*, TOTT. do. do.
- Mya truncata*, LIN. Dredged in Bedford Basin, Halifax. Dead specimen.
- Mya arenaria*, LIN. Whole coast; very common.
- Crytodaria Siligua*, SPENGL.|| Fishing banks; very common.
- Petricola Pholadiformis*, LAM. Sable Island; rare.
- Saxicava Arctica*, LIN. Whole coast; common.
- Saxicava Distorta*,¶
- Aanatina Papyracea*,\*\* SAY. GOULD, Sable Island.
- Cochlodesma Leana*, CON. Fishing banks; scarce.
- Thracia truncata*, MIGH. Do. do.
- Thracia Myopsis*, MOLL. Do. do.
- Lyonsia arenosa*, MOLL. Fishing bananks; rare.
- Pandora trilineata*, SAY. Sable Island; rare.
- Pholas crispata*, LIN. Sable Island; gigantic specimens.
- Teredo dilatata*, STM. Do. do.

\* In his account of the "Edible Mollusca of Nova Scotia" (reprinted in Knight's Descr. Catalogue of the Fishes of N. S.), Willis shows us clearly by his description of their size and shapes, that by *M. gigantea* he meant what is now called *M. solidissima*, and by *M. solidissima* he meant our *M. ovalis*.

† *Macoma fusca* and *proxima* respectively.

‡ Considered by Gould as synonymes of *Macoma proxima* and *fusca*, respectively.

§ Meaning, of course, what is now considered var. *Americana*, Gould, or by some a distinct species.

|| *Glycymeris siliqua*.

¶ Synonom for *S. rugosa*, which is probably but a variety of *S. arctica*.

\*\* Misprint for *Anatina papyracea*.



TEREDO ———, (?) J. R. W. Perhaps *T. Navalis*. Collected for me by Mr. FRANCIS BENTLEY, from one of the rough logs in his father's spar yard; very fine specimen.

## GASTEROPODIA

### OPISTHOBRANCHIATA.

*Philine quadrata*, WOOD. Fishing Banks; rare.  
*Philine lincolata*, COUTH. Do. do.  
*Scaphander puncto-striata*, M. Do. do.  
*Diaphana debilis*, GOULD. Do. do.  
*Utriculus pertenuis*, MIGH. Do. do.  
*Cylichna alba*, BROWN. Do. do.

### PROSOBRANCHIATA.

*Chiton marmorosus*, O. FABR. On stones, Halifax Harbor; ten fathoms.  
*Chiton laevis*, \* PENN. Do. do. do.  
*Chiton albus*, LIN. Do. do. do.  
*Chiton Emersonii*. Bedford Basin; common.  
*Tectura Testudinalus*; common; whole coast.  
*Tectura* ———, (?) new to me; from Professor McCULLOCH, Truro, N. S.  
*Lepeta caeca*, MULL. Fishing Banks; very rare species.  
*Pilidium rubellum*, O. FABR. † Do. do.  
*Crepidula unguiformis*, LAM. Sable Island, Wallace, Bay of Fundy.  
*Crepidula convexa*, SAY. Sable Island.  
*Crepidula fornicata*, ‡ LIN. Whole coast; common.  
*Crepidula glauca*. By T. BELT, Esq., F. G. S.  
*Cemoria Noachina*, LIN. Fishing banks and Halifax Harbor, ten fathoms.  
*Margarita Helicina*. O. BARR. Halifax harbor; common.

\* This is a European species which has not been reported from American waters by any other writer.

† We are not sure to what species Willis here refers.

‡ Probably too broad a statement. It is not found on Bay of Fundy coast of N. B., and probably not on Bay of Fundy coast of N. S., except in sheltered situations.

- Margarita argentata*, GOULD. Fishing banks.  
*Margarita obscura*, COUTH. Do.  
*Margarita varicosa*, MIGH. Do.  
*Margarita cinerea*, COUTH. Do.  
*Margarita Groenlandica*,\* MIGH. Do.  
*Ianthina fragilis*, GOULD. Only a fragment found at Sable Island to identify by; probably a drift shell.  
*Paludina decisa*, PAY. Many lakes of Nova-Scotia—not rare.  
*Amnicola porata*, GOULD. Dartmouth lakes; common.  
*Amnicola limosa*, GOULD. Block-house Pond, vicinity of Halifax.  
*Skenea Planorbis*, FABR.  
*Rissoa minuta*, TOTT. Common at low water.  
*Lacuna vineta*, MONT. Fishing banks; common.  
*Littorina littorea*, LIN. Whole coast; very com. Extends to P. E. I., N. F. L., and Labrador.†  
*Littorina paliata*, SAY. Do. do.  
*Littorina rudis*, MONT. Do. do.  
*Lacuna fusca* ‡ Fishing banks; common.  
*Scalaria Groenlandica*, PERRY. Fishing banks; scarce.  
*Turritella erosa*, COUTH. Fishing banks; scarce.  
*Turritella reticulata*, MIGH. Do. do.  
*Aporrhais occidentalis*, BECK. Bay of Fundy, Sable Island; rare.  
*Bittium nigrum*, TOTT. On eel-grass, Pictou. Prof. J. W. DAWSON.  
*Menestho albula*, MULL. Fishing banks; very rare.  
*Velutina zonata*, GOULD. Fishing banks, Halifax Harbor; very rare.  
*Velutina haliotoides*, MULL. Do. do.  
*Marsenina Groenlandica*, M.§ Do. do.  
*Natica clausa*, SOW. Do. do.

\* This is probably a variety of *M. undulata*.

† Its presence in Newfoundland and Labrador has not been confirmed by other writers. We cannot find that Mr. Willis gives elsewhere in his writings any authority for the statement as to its occurrence in either place.

‡ We are not sure to what species Willis here refers.

§ *Lamellaria perspicua*, St.

- Lunatia heros*, SAY. Sable Island, Nova Scotia sand beaches.\*  
*Lunatia triseriata*, SAY. Sable Isld. Fishing banks.  
*Lunatia Groenlandica*, MULL. Do. do.  
*Mamma* (?) *immaculata*, TOTT. Do. do.  
*Bulbus flavus*, GOULD. Do. do.  
*Amauropsis helicoides*, JOHNS. Do. do.  
*Bela turricula*, MONT. Do. do.  
*Bela harpularia*, COUTH. Do. do.  
*Bela violacea*, MIGH. Do. do.  
*Bela decussata*, COUTH. Do. do.  
*Bela pleurotomaria*, COUTH. Do. do.  
*Columbella rosacea*, GOULD. Do. do.  
*Purpura lapillus*, LIN. Whole coast; very com.  
*Nassa obsoleta*, SAY. N. W. Arm, Halifax Harbor, Pictou, &c.  
*Nassa trivittata*, SAY. Whole coast; common.  
*Buccinum undatum*. Do. do.  
*Buccinum ciliatum*, O. FABR. Fishing banks; rare.  
*Fusus pygmaeus*, GOULD. Whole coast; common.  
*Fusus Islandicus*, CHEMN. Annapolis Basin, Sable Island, &c.  
*Fusus decemcostatus*. Annapolis Basin, Sable Island, St. Margaret's Bay.  
*Trophon craticulatus*, O. FABR. Fishing Banks.  
*Trophon clathratus*, LIN. Fishing Banks.  
*Trophon scalariformis*, GOULD. Do.  
*Trichotropis borealis*, B. & S. Do.  
*Trichotropis Atlanticus*.† Do. very rare.  
*Admete viridula*, O. BABR. Do.  
*Fasciolaria ligata*, MIGH. Do.  
*Auricula denticulata*, GOULD (?) Halifax harbor; common.

## PNEUMOBANCHIATA.

- Ancylus parallelus*, HALD. In most lakes and ponds; common.  
*Limnea culumella*, SAY. Do. do.  
*Limnea catascopum*, SAY. Dartmouth lakes; rare.  
*Limnea clodes*, SAY. Pond near King's College, Windsor, N. S.

\* In his account of edible Mollusca, Willis tells us he has specimens of this species from Sable Island four or five inches in length, and broad in proportion. They are not known to attain this size elsewhere in Acadia, though to the south, on the New England coast, they become as large

† Now considered a synonym for *T. borealis*.

*Limnea modicella*, SAY—GOULD. Pond near Fort Needham,  
Halifax, N. S. J. R. W.

*Physa heterostropha*, SAY. Common.

*Physa ancillaria*. Dartmouth.

*Physa aurea*. Dartmouth; T. BELT, Esq., F. G. S.

*Succinea obliqua*. Common.

*Succinea avara*. Common.

*Succinea* ———, (?) Sable Island; a wonderful fact; \* collect-  
ed for me by P. S. DODD, Esq.

*Planorbis bicarinatus*, SAY. Dartmouth lakes, &c.; common.

*Planorbis deflectus*, SAY. Do. do.

*Planorbis Trivolvis*, Do. do.

*Planorbis dilatata*, Do. do.

*Pupa ovata*. J. M. JONES, Esq., Halifax; environs of Halifax, T.  
BELT, Esq.; rare.

*Helix nemoralis*, LIN. Perhaps imported; common.

*Helix hirsuta*, LAY. Do. do.

*Helix hispida*, GOULD. Do. scarce.

*Helix cellaria*, MULL. Do. do.

*Helix minuta*, SAY. In the woods west of Halifax; scarce.

*Helix lineata*, SAY. Do. do.

*Helix chersina*, SAY. Do. do.

*Helix electrina*, GOULD. In the woods, about 12 miles west of  
Halifax; scarce.

*Helix striatella*, GOULD. Do. do.

*Helix arborea*, GOULD. Do. do.

*Helix alternata*, SAY. Environs of Windsor, N. S.; common.

The following specimens were accidentally omitted.

*Spirula Peronii*, LAM. Sable Island.

*Coronula Diadema*, GOULD. Sable Island, Whales Back.

*Balanus miser*, LAM. Whole coast.

*Balanus Genuiculatus*, STM. Dredged in Bedford Basin. Fine.

*Balanus elongatus*, GOULD. Common.

*Anatifa vitrea*, LAM (?). About Sable Island,

*Anatifa laevis*. Common.

*Anatifa* ——— (?), Perhaps new to Nova Scotia. J. R. W.

\* Probably carried by aquatic birds.

- Valvata* —— (?). J. M. JONES, Esq.  
*Panopcea Norvegica*. Dredged by me in Bedford Basin, Halifax,  
but all dead specimens.
- Buccinum* —— (?). Entirely new to me; differs distinctly  
from *B. Undatum*. Collected for me by MR. JAS. FAR-  
QUHAR, on Sable Island; only one specimen.
- Fissurella* —— (?). Also new to me; from Sable Island.  
Collected for me by P. S. DODD, Esq., Sup'tdt. Sable Island.
- Testacella Haliotoidea* (?). FORBES & HANLY. Collected for me  
by MR. HARRIS, Richmond Nursery; perhaps imported;  
only one specimen.

Halifax,

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Island.

Island,

for me

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