

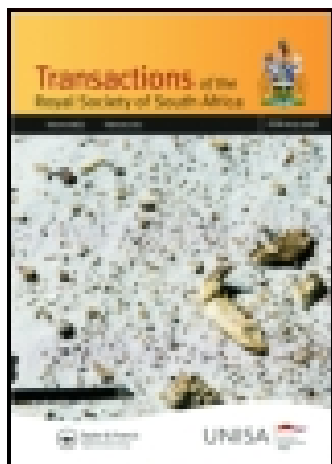
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### A SHORT ACCOUNT OF THE ATTACKS OF THE TEREDO NAVALIS, AND CHELURA TEREBRANS UPON GREENHEART (NECTANDRA RODCÆI) AND SNEEZEWOOD (PTEROXYLON UTILE) TIMBERS

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A SHORT ACCOUNT OF THE ATTACKS OF THE  
*TEREDO NAVALIS*, AND *CHELURA TEREBRANS*  
 UPON GREENHEART (*NECTANDRA RODIÆI*) AND  
 SNEEZEWOOD (*PTEROXYLON UTILE*) TIMBERS.

BY R. H. HAMMERSLEY-HENAN, MEM. INST. C.E.

[READ 28TH NOVEMBER, 1888.]

THERE is perhaps no experience more remarkable in the abstract, or interesting in its application, than that the greatest enemies of all life—both animal and vegetable—are to be found, in many cases, as organisms, infinitely small, lurking in and feeding on vital tissues, which they soon destroy. A proper understanding of the conditions under which such organisms exist and flourish, is of the vastest importance to applied science in almost every one of its many branches. In surgery the advance made in this direction appears almost incredible.

By the aid of antiseptics the surgeon now fearlessly enters portions of the human body, that a few years ago he would not have dared to touch.

Cultivators of plants now know they have enemies, which although indiscernible to the naked eye, are, when examined under the microscope, found to be armed with instruments of destruction, which they use with merciless rapidity if left undisturbed.

The engineer and naval architect have also long known of one or two of these small enemies. They belong to a class low down in the scale of life, but for all that, they work fearful destruction wherever they find a home. I refer to the *Teredo Navalis*, the *Chelura Terebrans* and the *Limnoria Terebrans*.

The *Teredo*, or the sea-worm as it is commonly called, is found in wood (under sea-water) which it perforates, nearly always in the direction of the grain of the timber, and lines the tunnel, or cavity, in which it lives with a calcareous wall. These tunnels, and the lined walls, can be easily traced and examined on the specimen pieces of wood I send to illustrate this paper, and the size of the worm itself can be accurately estimated.

The *Chêlura*, and *Limnoria*, are much smaller than the *Teredo*, and perhaps, for that reason are not so much dreaded, but nevertheless they are most destructive, and whatever they may lose in size they make up in numbers. I do not think I have seen the latter in this country. The former however is only too common, as I shall show further on. The specimens marked "B" are a portion of a waling destroyed by the *Chêlura*.

It is far beyond the range of my attainments to give anything approaching a scientific description of these mollusca, as my knowledge of natural history is painfully limited, and even if it were not so, no useful end would be served, for it would be difficult to deal more fully with the subject than M. de Quatrefages has done. I have however to make a statement which, if not scientific, is none the less indisputably and painfully true, and it is this, "the *Teredo* and *Chêlura* work complete destruction in timber that is considered proof against them," as I shall now endeavour to show.

The *Teredo navalis*—as its name implies—has been the dread of ship-builders in times past. And in Holland, and all over Northern Europe the source of endless trouble, oak, pine, elm, and all other kinds of timber then used in Europe succumbed to the ravages of this pest and it was not until the year 1840, when greenheart was first proved to be able to resist the worm in England, that timber could be used with safety in any permanent marine works, unless it was first protected with copper sheeting or scupper nails.

The experiments with greenheart, made some fifty or sixty years ago at Liverpool, having given satisfactory results, this timber at once came largely into general use for marine works, and has since been adopted by engineers in all parts of the world, and although in some localities it has been attacked, still the damage was so slight as to cause but little alarm, and greenheart continued to be considered *Teredo*-resisting timber.

The sneezewood (*Pteroxylon utile*) of this country is another timber that has long enjoyed a reputation of never having been known to yield to the attack of the worm. I shall however have to show in the course of this paper, that both timbers have, within my experience, entirely failed to uphold the favourable reputation they have so long held.

About fourteen years ago the railway from Port Elizabeth to Uitenhage was constructed by a private company, who decided for various reasons to use timber extensively in the construction of

its works. And the Engineer-in-charge who had had considerable Colonial experience, decided to utilize sneezewood for the pile work of all the bridges spanning the numerous small tidal streams that flow into the Zwartkops river; this timber was of the soundest and best quality procurable, and was evidently selected with much care and obtained at no small cost. It was the longest of its kind that I have ever seen, averaging about 20 feet long and about 12 inches square.

Some three years ago, Mr. J. S. McEwen, who was then the District Engineer at Uitenhage, noticed that the piles of a bridge, not far from Zwartkops Station were diminished in section, close to the low water mark. At first he thought it was merely the sap-wood that had decayed, but, on minute examination, discovered that the *Teredo* had attacked the piles, and so reduced their dimensions, that he decided to recommend that they be removed, and iron substituted. This was done, and when the piles were taken out, and carefully examined, it was found that they had in every case been more or less deeply burrowed into for about nine inches above, and nine inches below, the low water mark. I have told these facts to several "old Colonists" of experience in such matters, and in every case have been met by the remark, "it could not have been sneezewood, the worm has never yet been known to touch it." And I fully believe I would have failed to convince them to the contrary had I not been able to produce proof, which there is no possibility of escaping from, in the shape of the timber itself, showing the *Teredo* snugly incased in tunnels of its own making.

I do not think the members of the *South African Philosophical Society* will doubt the honesty of my statements; but as it is reasonable to suppose that they, as a body engaged in original investigation, may assume that I may have been mistaken; and as it is all-important, that no assertion—and more especially one which is opposed to popular belief—should be received until subjected to the most searching investigation, I send a specimen-piece of the timber I refer to—upon which the labours of the worm can be very easily traced—in order that those interested in the subject may examine it for themselves.

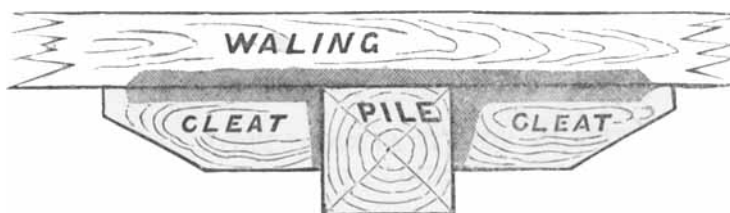
In the first portion of this paper I mentioned that greenheart (*Nectandra Rodiæi*) has long been looked upon in England and Northern Europe as practically a *Teredo* resisting timber, and that in consequence it has been much used for marine structures, and in most cases with marked success. It so happens however, that it falls to

my lot to show that not only is greenheart attacked by the ordinary worm in this country, but that it is also a victim to the ravages of the *Chêlura terebrans*, and I believe also to the *Limnoria* itself.

About the year 1878 the Port Elizabeth Harbour Commissioners had two Jetties constructed, from the designs and under the professional direction of Sir John Coode, Mem. Inst. C.E. For the most part wrought iron was used, but it was decided that the seaward ends, known as the V heads, should be—for special reasons—of wood, and after due consideration greenheart was selected as the timber most suitable for the purpose, and with this material—excellent of its kind—the work was carried out.

Some time ago, I had to make a detailed inspection of these Jetties, and on examining the V heads, I noticed what at first appeared to be signs of decay in one of the horizontal pieces, and, on cutting into it with an adze, found it completely honeycombed—for about an inch deep, with the tunnels of the *Teredo*, and, on further examination, found that all the horizontal timbers—at low water mark—had been in a like manner attacked. I then looked to the vertical pieces—or piles—and discovered that although the worm had entered many of them, still the progress it had made was small, compared to that on the horizontal pieces.

Having completed my inspection of this portion of the structure, and having satisfied myself that the *Teredo* was in undoubted and secure possession, where it will unquestionably remain until it has completed its work of destruction, I proceeded to examine the timber frame—also of *greenheart*—that has been placed outside the iron portion of the Jetties to act as a fender to prevent boats coming into direct contact with the iron. I there found not only the *Teredo*—evidently thoroughly enjoying itself, but also, in vast numbers, a most destructive little creature which I believe to be the *Chêlura terebrans*, which does not attack the timber in the general and haphazard way in which the *Teredo* appears to do, but invariably commences its work at the ends of the timber, or where one piece comes into contact with another, and in this way—although the actual area destroyed by it is comparatively small—it becomes more injurious to a framed structure than is its great competitor. To more clearly explain what I wish to convey, I give a simple sketch—in plan—showing what I actually found on the day in question. The shading represents the portions destroyed by the *Chêlura*.



It requires but little technical knowledge to see that the "cleats" and "walings" were rendered entirely useless—in fact so useless that at certain points the force of the sea was sufficient to disperse the piles.

Since my first inspection, the result of which I have just endeavoured to describe, I have made numerous examinations of these works, and have watched with interest and dismay the advances made by these mollusca, and am now only too fully convinced that before very long the question of replacing the timber-work will have to be faced, and when I state that it originally cost—for the two Jetties—some twenty-five thousand pounds, the seriousness of my subject may perhaps be realized.

In writing this paper I have had a two-fold object in view, firstly, a desire to let those engaged on similar works as myself know of my experience with timbers that have heretofore enjoyed a reputation which they certainly do not appear to me to deserve. And, secondly, in the hope that some of those members of this Society who have a special knowledge of marine insect life, and time at their disposal, may direct their attention to the subject with a view of discovering some means of guarding against the onslaughts of these most destructive pests. For it appears to me that the age that can boast of the labours of Pasteur on the silkworm, should not allow the *Teredo Chelura* and *Limnoria* to hold the field and work destruction in the peace and security they now enjoy.

I am aware that attempts have been made in this direction from time to time, and with varying success, but so far as I know nothing has yet been discovered that can be handed to the engineer and ship-builder, with the instructions "Use this, and your timber is safe from marine life attacks," and until that be done there is something *original* for science still to accomplish.

{R. H. HAMMERSLEY-HEENAN.