possible to construct strong models with free rotation at any desired point.

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A Water-Labile Fungistatic Extractive characterizing Living Trees

THE ability of living trees to resist attack by common fungi which destroy dead branches and lumber from these same trees seems to be in need of explanation. This problem is made more interesting by the fact that some wood-destroying fungi, such as *Schizophyllum commune* Fries, are in general unable to cause serious trouble even in wounded living trees.

The following method was used to demonstrate the fungistatic properties of extractives from catalpa (*Catalpa speciosa* Warder). Ground samples of heartwood, sapwood (the outer annual ring), and bark were extracted with 95 per cent ethyl alcohol. Pieces of filter paper were placed in the filtrate and then sterilized and dried in a hot-air oven. Two pieces of the filter paper were placed one inch apart on potato dextrose agar in a 'Petri' dish. *S. commune* was then inoculated into the agar equidistant from the papers. Filter paper similarly treated but placed in alcohol only was used in controls. Inhibition of radial growth was found to be in proportion to the concentration of extractive used—with heartwood extract giving most inhibition, followed by sapwood and then bark. Fungistatic materials have also been obtained by hot-water extraction, although, even after boiling in water for three hours, alcoholic extractives of high inhibiting potency have been demonstrated in the wood. Studies of materials from other tree species indicate a general prevalence of similar fungistatic substances, there being a quantitative difference in distribution. For example, the elm (*Ulmus americana* L.), the fallen timber of which is rapidly subject to decay by *S. commune*, contains comparatively small amounts of the inhibiting substance in wood taken directly from living trees.

Alcoholic extracts have retained their antibiotic nature, but water extracts have been found to lose this property rapidly. It has also been shown that there is a negative correlation between fungistatic capacity of alcoholic extractives and the length of time the branches are stored at room temperature in laboratory air or in water.

The fungistatic substances here described may be similar or identical with those previously reported but not correlated with relative resistance of living and dead trees[1,2], etc. This, and the ability of the extractive to inhibit other fungi, is yet to be determined. That there may be a connexion between these fungistatic materials and growth-regulating substances is suggested by the observation that dilute concentrations seem to have a stimulating effect[3]. Whatever the nature of these materials, the results of the experiments here reported present evidence that living trees contain substances which rapidly lose their antibiotic qualities upon the death of the tree.

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Mechanism and Significance of the 'Refractory Period' in the Avian Testis Cycle

BURGER[1] asserts that the "problem of refractoriness is perhaps the greatest relatively unsolved problem in reproduction". This problem, except in its ultimate details, may, in fact, have been solved[2]. It can be said that the "refractory period" (of Bissonnette[3]) or "dead sexual season" (of Polikarpova[4]) in seasonal birds is that part of the testis cycle during which the tubules are in a state of post-spermatogenetic lipoidal metamorphosis, and before the newly regenerated Leydig cells of the interstitium have become sufficiently mature and lipoidal to respond to neuro-humoral influences initiated by factors in the environment.

At the termination of spermatogenesis, the epithelial contents of the tubules metamorphose and disintegrate, the tubules themselves become reduced in diameter and the whole organ collapses. Concurrently, the exhausted Leydig cells (almost denuded of their lipoids during the last stages of the sexual season) of the old generation disappear, and there arises a new generation in the spaces between the shrunken tubules. Fibroblasts suddenly appear in great numbers and rapidly build up a new *tunica albuginea* just inside the old testis wall that has become thin, distorted and fragile due to its enormous spring expansion and to its sudden collapse during tubule metamorphosis.

This phase of breakdown and re-organization is associated with the post-nuptial moult and is probably responsible for the period of complete, or almost complete, sexual quiescence that now ensues. Also, during this time, experimental birds are 'refractory'—they cannot be forced into spermatogenesis by means of photostimulation. When the interstitium becomes again responsive, many species undergo a characteristic post-nuptial sexual display[5]. This occurs while the latter phase of the moult is still proceeding and while the tubules are still partially, and sometimes massively, lipoidal (Marshall and Coombs, unpublished). Most of the necrotic sperm debris has, however, been eliminated. The 'refractory period' varies in duration from species to species.

In the light of the above, it can be readily understood why Bissonnette and Wadlund[6] were unable quickly to achieve a second experimental spermatogenesis by photostimulation, and why Riley[7] failed to obtain light-induced spermatogenesis in September, yet succeeded in doing so in November. Likewise, Riley's success in stimulating juvenile birds in September becomes understandable, since these had not already undergone spermatogenesis and interstitial exhaustion and so their tubules had not