Communications

A New Clinical Test for Intravascular Clot

The cardiovascular tree normally contains somewhat over 5 lit of blood in the liquid state. Slowing down of the stream, trauma to the vessels, inflammation, disease, obstruction, and so on, upset this balance. Sludging of the formed elements along the side walls occurs, and this progresses to the formation of a clot. The continued presence of one or more of the precipitating factors causes the clot to extend. Clinically, a thrombo-phlebitis is diagnosed when heat, redness, pain, swelling, and so forth are present. In the absence of these signs and symptoms, the diagnosis is obscure. Despite this, a bland clot of phlebo-thrombosis may be dislodged and migrate to the pulmonary arteries with a fatal result. Despite great activity on this medical frontier, and the use of anticoagulant drugs, the death rate from pulmonary embolism remains unchanged. More than half the fatalities occur in patients who were not suspected of having an intravascular clot.

The bulk of these patients may be picked up by the following test which must be made when the patient enters the hospital. A pneumatic cuff is distended over the calf or thigh slowly to 180 mm of Hg pressure. If pain is elicited before this, the end point has been reached and the cuff is deflated. A positive cuff test is indicated by pain beneath the inflated cuff at 80, 100, or 120 mm of Hg. A negative test that becomes positive a few days post-operatively or several days after a patient has been put to bed with a myocardial infarction is presumptive evidence of intravascular clot and should be treated as such. Several hundred patients have been tested in this manner, and at this time the results are gratifying (*1*).

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Reference

1. For complete details, including case reports and a bibliography, see R. I. Lowenberg, *J. Am. Med. Assoc.*, in press.

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Longevity under Adversity in Conifers

Edmund Schulman's recent contribution [*Science* **119**, 396 (1954)] on longevity in conifers presents many facts concerning the occurrence of particularly old conifers but offers little to account for these occurrences or to clarify the connection between high ages an environments. Actually, there appear to be sound reasons why such old specimens occur where they do and why they represent only a limited number out of the total native coniferous species.

Although, in his paper, Schulman deals primarily with trees growing in environments adverse to rapid growth, the oldest living examples, individuals of *Sequoia gigantea,* are found in environments highly favorable for growth, and this is relatively true also for *Sequoia sempervirens* and *Fitzroya cupressoides.* Young trees of *S. gigantea* almost invariably show rapid diameter increment, and only after they gain considerable size does their growth eventually become slow.

There is reason to believe that the favorable nature of the environment contributes to the unusual longevity in these species. Another very important factor in their longevity is the absence of aggressive insect enemies, such as defoliators or primary bark beetles, or serious diseases other than heart rots. A third factor is their capacity for adaptation to temporary changes in moisture supply or to partial loss of crowns without an accompanying danger of early mortality. A fourth factor is the long-sustained vigor of their root systems, for it is the functioning of the roots that primarily determines the age to which a tree will live, barring destruction by external agencies. With regard to heart rots, the evidence (*1*), which there is not space to discuss here, indicates that there is no basis for regarding them as "a form of dieback," as Schulman's interjected question suggests.

For the species for which longevity appears to be associated with adverse situations, some of the important features in the environment of a long-lived tree are (i) comparative isolation; (ii) low annual precipitation and relatively low air humidity; (iii) absence of destructive pests; and (iv) an exposed position, insuring ample air movement. Open surroundings are essential, not only to encourage a stout, spreading form of growth and as a protection from destruction by running fires, but, more important, to provide ample unoccupied ground into which the roots will be able to spread during the life of the tree.

With some species, geographic isolation is also a prime requisite. It is significant that the only ponderosa pine among the old trees in Schulman's list is situated outside the range of the western pine beetle, *Dendroctonus brevicomis,* and also outside the areas where the needle fungus, *Elytroderma deformans,* is destructive. The propensity of the western pine beetle for attacking old, slow-growing, or declining ponderosa pines is so well established that trees of this character are marked for cutting to prevent their loss from beetles (*2*). Many individuals of species such as Engelmann spruce (*Picea engelmanni*) would undoubtedly reach relatively high ages were it not for devastating bark beetle epidemics (*3, 4*) or activities of other destructive enemies.

Low annual precipitation restricts growth and consequent disadvantageous bulk but still permits the tree to maintain life. Low humidity favors the development of compact foliage and discourages the establishment of disease and decay fungi, an effect further heightened by the rapid air movement associated with an exposed position. The relative absence of decay in old trees in locations such as the White Mountains rests primarily on these climatic features of the local environment, together with low night and winter temperatures, long distances from spore sources for decay fungi, a high resin content of exposed wood, and the presence in the wood of fungistatic phenolic substances such as pinosylvin (*5*).

A tree may be reproduced vegetatively through numerous generations, and therefore one may deduce that it is capable of indefinite life, yet all field evidence points to the conclusion that any individual tree, as such, ages as does any other complex organism, with death as the final outcome. Foresters recognize this in the formulation of tree classifications (*6*). For most conifers, the end comes through insect attack or other visitation after physiological decline has become marked. For *Sequoia gigantea,* which is unusually free of insect enemies, it hardly seems necessary to suggest, as Schulman has done, the possibility that all then living specimens were wiped out by some catastrophe 3000 to 4000 yr ago. The end for these forest giants comes when reduction in root systems through deterioration reaches a point at which the tremendous bulk of trunk and top can no longer be mechanically supported, and they fall. This accounts for the lack of standing sequoia snags on which Schulman has remarked.

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References

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I am grateful that my report of some precise dating work on newly discovered Methuselahs among stunted conifers has called forth a professionally competent review of possible factors favoring their existence. The rich category of old *little* trees, which, in contrast to the category of old *big* trees, appears to have been quite neglected until recent years, may well owe its existence, as Wagener implies, to a set of factors largely different from those that favor lush growth.

Although the reasons for the occurrence of old drouth conifers summarized by Wagener are surely appropriate, my own field experience strongly suggests that special factors play a major role in the cases of those relatively few examples of absolute maximum longevity, to which my report in *Science* was necessarily limited. It was repeatedly observed that, in a general and usually rugged area of high aridity in which occurred very old trees growing on adverse sites, only one or two small localities bore the individuals of maximum ages, and these ages were often quite markedly greater than those elsewhere in the area. That natural selection has operated at such sites is, perhaps, obvious. Local concentrations of soil antibiotics may well exist. And that the wood may contain special substances, as Wagener notes, is indeed likely; a more satisfactory statement in this regard may perhaps be made when chemical analysis has been completed of the stem of the 1650-yr Sun Valley limber pine (tree No. 3966, Table 1, of my article), which was felled in part for this purpose.

Wagener's preference for the second of the two possibilities suggested by the lack of standing giant sequoia snags seems well based.

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The Piltdown Nasal Turbinate and Bone Implement: Some Questions

Now that the Piltdown mandible has been established as that of an anthropoid ape (*1*) and the larger cranial bones shown to have originated from three different sources (*2, 3*), some questions and doubts seem to be in order concerning the remaining Piltdown skull bones and artifacts. When I examined the original Piltdown bones in 1951 (*4*), I was astonished to find that, among the human bones recovered at Piltdown, substantial portions of a turbinate were represented. Dawson (*5,* p. 85) described the discovery of the turbinate as follows:

> While our labourer was digging the disturbed gravel within 2 or 3 feet from the spot where the mandible was found, I saw two human nasal bones lying together with the remains of a turbinated bone beneath them *in situ.* The turbinal, however, was in such bad condition that it fell apart on being touched, and had to be recovered in fragments by the sieve; but it has been pieced together satisfactorily by Mrs. Smith Woodward.

Woodward in the same paper (*5,* p. 87) observed:

> The remains of a turbinal found beneath the nasal bones are too much crushed and too fragmentary for description; but it may be noted that the spongy bone is unusually thick, and has split longitudinally into a series of long and narrow strips.

I have not studied this turbinate, so that I can say nothing useful concerning its anatomical characteristics, but what strikes me as most remarkable about this bone is its very existence. I do not recall any instance in the annals of paleoanthropology of this extremely fragile bone ever having been recovered in a fossil hominid. Indeed, the delicacy of the turbinates is such that these bones are among the first to crumble even in comparatively recent burials. In view of the doubt that at present surrounds the whole Piltdown find, it seems necessary to explain the presence of the turbinate bone.

Is it possible that the turbinate does not in fact