may add their intimate relationship to the electrons of chelated metals evident in such molecules as respiratory enzymes, hæmoglobins and chlorophyll; and resonance stabilization of monovalent radicals, quoted by the authors with reference to pyridoxal phosphate aldimine, but probably of far greater significance in the fields of photosynthesis and of respiration[7].

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Many authors have noticed the properties of π-electron delocalization in one or another group of biomolecules. We tried to quote as many of them as we knew about in our article to which Prof. Lemberg refers. What we considered as being a hitherto unnoticed aspect of biochemistry is the *general* observation that "*all* the essential biomolecules which are related to, or perform, the fundamental functions of the living matter are constituted of completely or, at least, partially conjugated systems, rich in delocalized π-electrons".

We regret having omitted to quote Dr. Lemberg's remarks in this field which were published in Australian journals which are difficult to find here. In relation to these remarks it must, however, be observed that Dr. Lemberg stressed the presence of conjugated π-electrons uniquely in the so-called biological 'pigments'. Neither the nucleic acids, nor the proteins, nor the energy-rich phosphates, nor any of the group transfer-coenzymes such as pyridoxal phosphate, thiamine pyrophosphate, tetrahydrofolic acid, are mentioned by him in connexion with this problem. Neither did he explain his view of the role of resonance in compounds other than some of the respiratory pigments. His concept of the importance of π-electrons in the processes of life is therefore, in our view, much more restricted than ours.

As to the role of delocalized π-electrons in relationship to the electrons of chelated metals or to the stabilization and structure of monovalent radicals (for example, in the field of respiration) we have discussed this problem partially in our papers, respectively, on the electronic structure of iron-porphyrin complexes[1] and of the respiratory coenzymes[2].

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Spiral Thickening in Normal and Compression Wood

Examination of four horizontal branches of each of *Taxus baccata* L. and *Torreya californica* Torr. showed the pith eccentric toward the upper side and on the lower side wood similar to compression wood except that the fine spiral striations typical of compression wood tracheids were not visible.

The spiral thickening in these tracheids was less abundant and less distinct than in comparable normal wood tracheids from the upper side of the specimens. Pillow and Luxford[1] made a similar observation for Douglas fir and "a few other conifers". According to them, in pronounced compression wood, the spiral thickening was confined wholly to the early spring wood cells, whereas, in normal wood, it occurred throughout spring wood and in early summer wood. Although such a distribution of spiral thickening in normal wood tracheids of Douglas fir seems to be the rule[2–4], it should be noted that according to these authors the spiral thickening is found throughout the width of a growth ring of normal wood of *Taxus* and *Torreya* while in *Picea* and *Larix* spiral thickening, when it occurs, is confined to the late wood[2,4]. However, in *Taxus baccata* and *Torreya californica* the spiral thickening occurred throughout the width of a growth ring, both in the normal wood tracheids and in those of pronounced compression wood.

In an investigation of the orientation of the spiral thickening in normal wood tracheids of *Pseudotsuga taxifolia* and *Taxus baccata*, Wardrop and Dadswell[5] found that the angle of inclination of this thickening to the longitudinal axis of the cell decreased with the increasing cell length from the pith outwards. In the material at present under consideration, in the normal wood tracheids and fibre-tracheids this angle remained more or less transverse throughout any growth ring (Fig. 1) from the pith outwards. The wood from horizontal roots of these species, where compression wood was not found, also showed a similar arrangement of the spiral thickening. The view[3] that the angle of the spiral thickening is dependent on the width of the cell and the thickness of the cell wall suggests that the late wood tracheids have steeper spirals than those of the early wood; this does not find support from the present observations. Moreover, in the branches of *Taxus baccata* and *Torreya californica*, the orientation of the spiral thickening in the compression wood tracheids was about 45° (Fig. 2), paralleling the orientation of the elongated pit mouths (see Fig. 2) and also possibly indicating the microfibrillar angle in the layer comparable with *S2* layer, while that of normal wood tracheids was more or less transversely oriented and usually associated with circular pit mouths, both in branch and root wood. When this mouth was elliptical, the long axis of the mouth was inclined at about 45° or sometimes at a smaller angle. When both the compression and normal wood tracheids occurred in the same growth ring, the difference in the orientation of the spiral thickening was apparent.

Pillow and Luxford[1] stated that the orientation of the spiral thickening had no relation to that of the fibrils

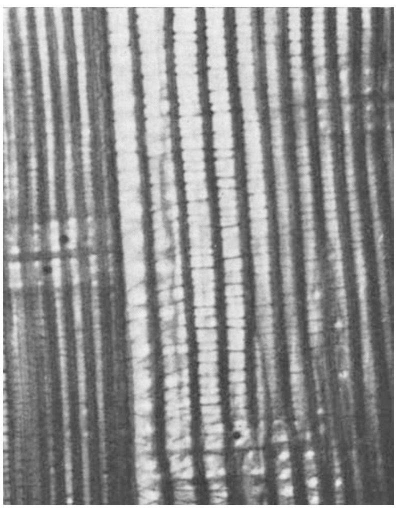

Fig. 1. *Taxas baccata.* Radial longitudinal section of normal branch wood showing the angle of inclination of the spiral thickening to the long axis of the cell (× 180)