of their bases, which become hardened and persistent, or they may be articulated to the stem and fall off, leaving characteristic scars in spiral series upon the stem. The stem is frequently much increased in apparent thickness by the downgrowth of aerial roots, forming a black coating several inches or even a foot in thickness, but its essential structure differs little in principle from that familiar in the rhizome of the common bracken *(Pteris).* To the ring or rather netted cylinder of fibro-vascular bundles character­istic of all fern stems scattered internal as well as external bundles arising from these are superadded ; and in a tree­fern these are of course in greater numbers. The outer bundles give off branches to the descending roots from the region where they pass into the leaves.

Tree-ferns are of course cultivated for their beauty alone ; a few, however, are of some economic applications, chiefly as sources of starch. Thus the beautiful *Alsophila excelsa* of Norfolk Island is said to be threatened with extinction for the sake of its sago-like pith, which is greedily eaten by hogs; *Cyathea medullaris* also furnishes a kind of sago to the natives of New Zealand, Queens­land, and the Pacific islands. A Javanese species of *Dicksonia (D. chrysotricha)* furnishes silky hairs, which have been imported as a styptic, and the long silky or rather woolly hairs, so abundant on the stem and frond-leaves in the various species of *Cibotium,* have not only been put to a similar use, but in the Sandwich Islands furnish wool for stuffing mattresses and cushions, which was formerly an article of export. The “Tartarian lamb,” or *Agnus scythicus* of old travellers’ tales in China and Tartary, is simply the woolly stock of *C. Barometz,* which, when dried and inverted and all save four of its frond-stalks cut away, has a droll resemblance to a toy sheep.

See Fern; J. Smith, *Histοria Filicum;* Luerssen, *Med. Ρharm. Botanik·,* and for the structure of the stem, De Bary's *Vergleich. Anatomie d. Phanerog. u. Fame.*

TREGELLES, Samuel Prideaux (1813—1875), New Testament scholar, was born at Wodehouse Place, near Falmouth, on January 30, 1813. His parents were Quakers, and he himself for many years was in communion with the (Darbyite) Plymouth Brethren, but latterly he became a member of the Church of England. He was educated at Falmouth grammar school, and afterwards, without having attended any university, held various modest educational appointments, but finally devoted himself entirely to a laborious student life, until he was incapacitated for literary work by paralysis in 1870. He died at Plymouth on April 24, 1875.

Most of his numerous publications had reference to his great critical edition of the New Testament (see Bible, vol. iii. p. 648). They include an *Account of the Printed Text of the Greek New Testament* (1854), a new edition of Horne’s *Introduction* (1860), and *Canon Muratorianus : Earliest Catalogue of Books of the New Testament* (186S). As early as 1844 he published an edition of the Apocalypse, with the Greek text so revised as to rest almost entirely upon ancient evidence. Tregelles wrote *Heads of Hebrew Grammar* (1852), translated Gesenius’s *Hebrew Lexicon,* and was the author of a little work on the *Jansenists* (1851) and of various works in exposition of his special eschatological views (*Remarks on the Prophetic Visions of Daniel,* 1852, new ed. 1864).

TREMATODA, popularly known as “flukes,” form one of the three main divisions of the flatworms or *Platyhel- minthes.* They have been defined thus (Jackson, 1)@@1—

“ Unisegmental *Vermes,* with a flattish, leaf-like, more or less cylindrical body provided with organs of adhesion in the shape of suckers and sometimes of chitinoid hooks. The cuticle, so called, appears to be a metamorphosed layer of cells. There is a well-developed nervous system, the ganglia of which are entirely supra-pharyngeal, *i.e.,* dorsal. There is a mouth, and an alimentary canal which is usually forked, but no anus. The excretory system has the form of more or less branching tubes commencing with flame­cells, and either ending in a contractile vesicle or opening by two independent orifices. Hermaphrodite self-impreg- nation occurs, as well as reciprocal impregnation. The embryo either develops direct into the sexual form (mono- genetic *Trematoda)* or gives origin to a series of inter­

mediate non-sexual dimorphic forms (digenetic *Trematoda).* Parasitic.”

*Historical Sketch.—*Some of the more salient points in the history of our knowledge of these animals have already been alluded to in the article Parasitism (*q.v.) ;* a few additional facts must, however, be mentioned here. The *Trematoda* were first formed into a group by Rudolphi (2), who included in it the following genera :—*Monostoma, Amphistoma, Distoma, Tristoma, Pentastoma,* and *Poly­stoma* ; the name had reference to the suckers, which Rudolphi regarded as being for the most part openings into the body (Gr. *τρῆμα,* an aperture). Some of these forms were soon perceived to have but small connexion with the others ; and Cuvier (3) reduced the whole to one genus, for which he adopted the name *Fasciola,* Linn. The Pentastomes have since been transferred to the Arachnida (*q.v.*)∙

Our scientific acquaintance with the group may be said to date from 1831, when Mehlis noticed that the eggs of certain Distomes hatched into a minute ciliated body with an eye-speck resembling an Infusorian, an observation which gave the key to the life-history of these forms. Von Siebold in 1835 (4) supplemented this discovery by the observation that the ciliated embryo of *Monostomum mutabile* contained, as a “necessary parasite,” as it was termed, an organism identical with the “ kingsyellow worm ” (*Redia),* found by Bojanus in pond-snails, and Von Baer had previously shown (5) that these gave rise to free-swimming organisms not unlike tailed Trematodes. The materials were thus ready to hand for a co-ordination of the whole life-history, and Steenstrup recognized it as an instance of the so-called “ alternation of generations ” (6). These researches received important additions at the hands of Pagenstecher (7) and others, who showed experi­mentally that encysted Distomes grow mature directly after their transference from one host to another, and thus that a migration is necessary to the attainment of their mat­urity, Diesing’s great work (8) appeared in 1850, and has formed the groundwork of all subsequent treatises on the systematic arrangement of parasitic worms, although it included forms which really belong to quite different groups. In 1861 Van Beneden gained a prize offered by the French Academy by his elaborate memoir on the intes­tinal worms (9), in which he not only described many new and interesting forms, but gave anatomical details regard­ing others previously known, and entered into detailed comparisons between the Cestodes and Trematodes, both in their adult and immature states. Of recent years the chief additions to our knowledge have been more in the direction of further details regarding the structure and life-history of special forms than the elaboration of new general principles.

*Anatomy.—*In endeavouring to give a very brief account of the more salient points in the anatomy of the *Trematoda* it has been thought expedient to select some well-known form as a type, and afterwards to indicate the characters in which other species differ from it ; for this purpose the common liver-fluke, *Fasciola {Distomum) hepatica* has been chosen, as it is not unfrequently found in the bile-ducts of sheep and other domestic animals, and constitutes a scourge much dreaded by farmers. The account here given is in the main abstracted from Sommer (10).

*External Appearance. —*The animal has a flattened oval shape, with a sub-triangular process on the broader end, which represents the head. The total length varies from 20 to 35 mm., the breadth from 6 to 12 mm. On superficial examination two narrower lateral areas may generally be distinguished from a broader median one ; the former are occasionally of a coarsely granular appearance and reddish-brown or orange in colour, and increase in breadth towards the posterior end of the body, where they commonly unite. The median area is commonly greyish-yellow in colour, sometimes spotted with black ; its anterior portion corresponds to the uterus, the posterior to the testes. Two suckers (fig. 1, A, *o, s)* are in the middle line of the body ; one is at the anterior extremity, and is directed forwards and somewhat downwards ; it is known as the

@@@1 These figures refer to the bibliography at the end of the article.