use, the enterprise grew into the provision of Christian literature, not only for home use, but also for the mission fields of the world. With this growth there proceeded another develop­ment, the production of books and magazines being added to that of tracts. The title “ Tract Society ” has, in fact, become misleading, as suggestive of limitations which had but a brief existence and are no longer recognized by the more important agencies. On the other hand it must not be supposed that because the work has gone beyond the provision of tracts, these are no longer widely employed. Probably their use in various forms at home was never wider than it is to-day; whilst in India, China and elsewhere the attack of the Christian tracts is being met by the circulation of vernacular tracts in defence of the non-Christian faiths.

*The Society for Promoting Christian Knowledge,* founded in 1698, though most widely known as a publishing agency, assists in a wide variety of ways the work of the Church of England. On its publication side, it is for its own Church both a Bible society and a tract society. Moreover, its publications include not only versions of the Holy Scriptures and of the Liturgy, but also theological and general literature in many forms. It has given much attention to providing good reading for children; whilst its tract catalogue is especially rich in works bearing on Christian evidences, Church seasons and the doctrines of the Anglican Church. To the foreign missions of the Church the S.P.C.K. has been a helper of the utmost value, more especially in regard to their medical missions and their use of Christian literature. In the latter case the help is given by grants of works produced either at home or by mission presses in the field. As early as 1720 it was using Arabic; but it has from time to time been of especial value in helping to found a Christian literature in languages or dialects just reduced to writing. Thus whilst recent publications for the mission field include works in Arabic, Chinese and Urdu, they also include publications in Addo, Lunyoro and Sgau Karen.

*The Religious Tract Society,* founded in 1799, and thus contemporary with the great missionary agencies and the Bible Society, is, like the last-named, an interdenominational organization. Its earliest publications were in English and were tracts. But it speedily undertook book publications and extended its field of operations. It began to provide tracts for China in 1813, and as early as 1817 an auxiliary tract society was founded at Bellary in India by some men of the 84th Regiment. In undertaking book publication, the society became one of the pioneers in the provision of sound and cheap literature; whilst by the issue of the *Sunday at Home,* the *Leisure Hour,* the *Boy's Own Paper,* the *Girl's Own Paper,* the *Cottager and Artisan* and other periodicals, it helped to lead the work in the provision of popular magazines. Like the S.P.C.K., the R.T.S. now produces general theological literature as well as tracts in a variety of forms, whilst it also gives especial attention to the provision of healthy reading matter for young people. Its grants of books and tracts are open to members of all Protestant denominations. The society aids Protestant communities on the Continent by maintaining depots at Madrid, Barcelona, Lisbon, Vienna, Budapest and Warsaw; whilst it also assists, by grants, publication work in France, Italy, Russia, Turkey, and Scandinavia. In the mission field it works mainly through subsidiary tract societies locally organized. The chief of these tract and book societies are in India carried on at Calcutta, Madras, Bombay, Bangalore, Allahabad and Lahore; in China at Peking, Shanghai, Hong Kong, Canton, Hankow, Chung-king and Mukden; and in Japan at Tokio. The literature produced by these organizations ranges from com­mentaries on the Holy Scriptures to the simplest tracts and leaflets. In 1908 the society opened a special fund in aid of its Chinese work, and by this means the provision of Christian literature in book and tract form for Chinese readers has been greatly extended. Much literature for various foreign fields is also produced in Great Britain and distributed from the society’s headquarters. As with the S.P.C.K., the R.T.S. has been of great service in providing (next to the Holy Scriptures) the earliest literature for some languages. Thus it has helped to provide tracts for the Miaos of west China and for the Baganda, together with the *Pilgrim's Progress* in Bemba and in Ewé, two little-known African tongues. The languages in which works produced or aided by the society have appeared number about 300. In the distribution of its grants of tracts for home work nearly all the great evangelical organizations have a share. In the administration of a subsidiary tract society all the evangelical agencies at work in its field are as a rule represented.

In addition to the work of these societies, the production and distribution of tracts at home is carried on by *the Stirling Tract Enterprise,* which also sends grants of its publications to India, Ceylon and Africa; by *The Children's Special Service Mission,* which also issues publications in Chinese, Japanese and some Indian languages; and by *The Scripture Gift Mission,* which sends its publi­cations into China and the East generally. In the mission field *The Christian Literature Society for India* (formerly the Christian Vernacular Educational Society), established in 1858, has its head- quarters in London with auxiliary committees in India and Ceylon. It will always be associated with the name of Dr John Murdoch (d. Aug. 10, 1904), its secretary for nearly half a century. It works on similar lines to the tract societies, but includes a wider range of educational literature, in the provision of which it has been especially helpful to the mission schools of India.

*The Christian Literature Society for China* (formerly the Society for the Diffusion of Literature and General Knowledge among the Chinese) is incorporated (1909) in Shanghai, but has an advisory committee and an executive committee in London. lt has been of great service in approaching the official and upper classes of China by its magazines and books, as well as by the diffusion of more popular literature.

*The American Tract Society* (New York) works, both in regard to domestic and foreign enterprises, upon similar lines to those of the Religious Tract Society. Upper Canada has its tract society also and similar organizations exist on the continent of Europe.

(A. R. B.)

**TRACTION** (Lat. *trahere,* to draw), the act of drawing or hauling. As used in this article the term refers to the methods of employing animal and mechanical power for transporting persons or things from place to place in wheeled vehicles.

*Animal Traction —*The oldest form of motive power is that of animals, those most commonly employed for draught purposes on ordinary roads being horses, mules, donkeys and oxen. On the continent of Europe dogs are often harnessed to light carts or barrows, but in England their use in this way was prohibited by the Cruelty to Animals Act of 1854. Camels and elephants are only rarely used as draught animals in special circumstances.

When men and animals carry burdens, or draw or propel loads in certain vehicles, it is difficult, and sometimes impossible, to determine the duty performed in foot-pounds of work, because of the uncertainty of the amount in pounds of the resistance overcome. In this case, for the purpose of comparing performances of the same kind with each other, a unit is employed called a *foot-pound of horizontal transport,* meaning the conveying of a load of 1 lb 1 ft. horizontally. The following table, given by W. J. Macquom Rankine, gives some examples of the daily duty of men and horses in units of horizontal transport, L denoting the load in lb, V the velocity in feet per second, and T the number of seconds per day of working:—

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | L. | **V.** | T/3600· | LV. | LVT. |
| lb. | Feet per second. | Hours per  day. | lb. con­veyed I ft. | lb. conveyed 1 ft. |
| Man—  Walking unloaded, transport of own weight | 140 | 5·0 | IO | 700 | 25,200,000 |
| Do. do | 140 | 6·0 | 10 | 840 | 30,240,000 |
| Wheeling load L in two-wheeled barrow, returning empty; V = ⅜ velocity | 224 | 1·6 | 10 | 373 | 13,428,000 |
| Do. one-wheeled barrow, do | 135 | 1·6 | IO | 225 | 8,100,000 |
| Travelling with burden | 00 | 2·5 | 7 | 225 | 5,670,000 |
| Conveying burden, returning unloaded | 140 | 1∙6 | 6 | 233 | 5,032,800 |
| Carrying burden for 30 seconds only | 252 |  |  |  |  |
| 126 | 11∙7 | — | 1474·2 | — |
| — | 23∙1 | — | — | — |
| Horse—  Walking with cart always loaded | 1500 | 3·6 | 10 | 5400 | 104,400,000 |
| Trolling do. do | 750 | 7·2 | 4½ | 5400 | 87,480,000 |
| Walking with cart, going loaded, returning empty; V = ½ mean velocity | 1500 | 2·0 | 10 | 3000 | 108,000,000 |
| Carrying burden, walking | 270 | 3·6 | 10 | 972 | 34,992,000 |
| Do. trotting | 180 | 7·2 | 7 | 1296 | 32,659,200 |

For tramway service, horse, or occasionally mule, traction was formerly employed almost universally, but on account of limited speed and high cost it has been generally abandoned, except in a few localities, where the smallness of the line, low value of livestock, labour and feed, and long headway intervals, make it still profitable.

The tractive force required on a straight and level tramway is found to vary from 1/150 to 1/50 of the load, according to the condition of the rails. On a tramway having grooved rails in average condition it is about 1/100. The resistance is thus, at the best, nearly double that on a railway, and sometimes as much as on a good paved road. This is due to the friction of the flange of the wheel in the grooved rail, and to the fact that the latter is always more or less clogged with dirt. The