observed. From the tabulated results, it appears that the periods of vibration for the fundamental and first two overtones, while varying considerably for different rifles, may be said to be roughly about 0·04, 0·008 and 0·002 of a second, and the first two overtones are those the periods of which have been the most completely determined. In the case of the other vibrations, most of the tabulated results contain the mere indication that they have been observed, from which it is a natural inference of the reader that they have been much less intense, a result

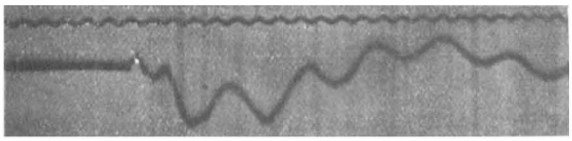


FIG. 1.—10-Millimetre Servian rifle, right-handed breech, fixed in cork.

which appears on general grounds highly probable. The nodal points of the overtone appear to a certain extent to vary periodically in position. The vertex of the angle of vibration, instead of being at the screw of the breech pin, as commonly assumed, is at a nodal point near the muzzle, a result arising from the effect of one of the overtones at the instant when the bullet leaves the gun, and as the overtones predominate, the vertex approaches the muzzle.

Of practical interest is the conclusion that, since a certain time elapses before the vibrations are completely

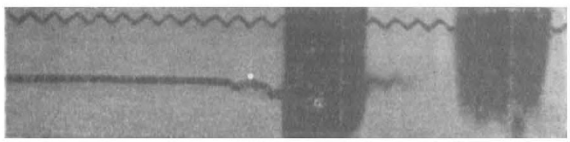
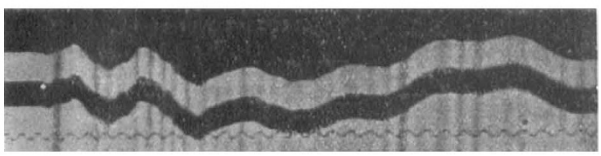


FIG. 2.—11-Millimetre Mauser held as in rifle practice. The white spot y, indicates the instant of the bullet leaving the barrel.

formed, it is important that the bullet should leave the muzzle before the deflection of the barrel has become considerable, and hence that a small-bore gun is to be preferred to one of large calibre. In the six-millimetre Mauser gun, it would appear, from the position of the white dot in Fig. 3, that the limit in this direction has practically been attained, so far as horizontal vibrations are concerned.

Two further points are discussed. The effect of the breech has been observed by comparing guns with a right-handed and left-handed breech respectively. In



y

FIG. 3.—6-Millimetre Mauser rifle, fixed in cork.

the former, a deviation to the right of 7mm. per 4·5 metres was observed, in the latter, a deviation to the left of 4 mm. in the same distance.

The other question arises in connection with the attachment of bayonets. In some observations of the horizontal vibrations, a rifle of 11 mm. calibre was experimented on, with the bayonet attached at one side, the lateral attachment being the best calculated to affect these particular vibrations. The effect was to increase the periods of the first overtone from 0·0095 to 0·0130 of a second and of the second from 0·0016 to 0·0036 of a second, to give rise to a third overtone of period 0·0011 of a second and also to alter the phase at the instant at which the bullet left the muzzle.

The paper of which this is a brief summary is published in the *Abhandlungen* of the Bavarian Academy (cl. 2, vol. xxi. part iii., pp. 559–574), and it will be seen that it has an important bearing on rifle shooting generally. A marksman who is fully aware of the nature of the vibrations occurring in his rifle ought to be able to allow for them, with a little practice, far better than one ignorant of the scientific aspect of the question.

G. H. BRYAN.

## PROF. JOHN YOUNG.

JOHN YOUNG was born in Edinburgh in 1835. He was educated at the High School and at the University, and finally he graduated as doctor of medicine. Like many of his time, he came under the spell of the great teachers who then made the northern university famous, such men as Goodsir, Edward Forbes, Christison, Syme and Simpson, and there is reason to believe that in particular the first two gave a scientific bias to Dr. Young's career. For some time he worked on the staff of the Ordnance Survey and made a friend of Sir Roderick Murchison, then a leader in the geological world. This was followed by his appointment to the chair of natural history in the University of Glasgow in 1866, and in this chair he taught both zoology and geology for nearly thirty-five years. After a period of failing health, he died on December 13, 1902. Such, in brief, is an outline of his career, but those who knew Dr. Young will recognise how imperfect a representation it is of the man's personality. Gifted with a keen and penetrating intellect and a fertile imagination, showing versatility of acquirements rarely met with, absolutely unconventional, he was also a man of untiring and restless energy. He was a scholar in a high sense of the term, he possessed a cultivated and pure literary taste, he was an artist facile both with brush and pencil, and he had a wide and critical taste in music. As keeper of the Hunterian Museum, he acquired much knowledge of rare books and manuscripts, of the great collection of coins and medals to be found there, and of works of art. Wide, however, as was the sphere of his activity in the University, he yet found time for active labours in the cause of female education, in the work of the Technical College, and in the municipal and social life of the city of Glasgow. It was this versatility and superabundant energy that hindered Dr. Young from doing the amount of original work in the two sciences of zoology and geology which might have been expected from a man of his genius, and the work of his life must not be judged from this point of view. His chief labour, perhaps, was the systematic arrangement of the great legacy of William Hunter—books, pictures, medals, engravings, coins—and in this work he took a keen delight and over it he spent laborious hours, even far on into the night when silence reigned in the cloisters. But it was the man's individuality of character that made him a force in his time. Often a determined opponent, he could also be a true friend, while his mental moods, sometimes quiet and observant, ofttimes brilliant and radiant with flashes of wit and humour, constrained even those who knew him best to regard him as a man quite by himself. He has thus left little of an enduring character in the literature of science, but he will be long remembered by many generations of students in the University of Glasgow.

JOHN G. MCKENDRICK.



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