

more directly underneath the superincumbent weight with the accompanying outward or balancing shoulder motion occupies a portion of time, and occasions a rolling or swinging gait, which is more perceptible in the fore than in the hind limbs. The same rolling action is also seen in walking. A wide chested horse trots much like a bulldog, and for the same reason, viz., a new centre of gravity has to be found for every step, a new balance for every stride, and side motion attends the motion in a forward direction. In galloping, the two fore feet are together on the ground at one moment, and the two hind feet at another; in this action do not require to be brought so much inward, because, being placed one on each side, they restrain the weight without. Owing, however, to the distance at which they stand apart, the action is wide, loose, and jarring. We assume, then, from what we have seen in animals adapted for most rapid action, that this flattening inside the shoulder-blades, and corresponding approximation of the fore legs, are necessary conditions of form. It is, however, quite apparent that such flattening will greatly reduce the chest in size, and thus lessen the lungs within. A remedy, however, is ready for such a seeming evil. It is this: the chest of a well-formed horse is increased in depth, in order to compensate for apparent want of width. When the chest is thus narrowed from side to side before, the fore-legs approach in like proportion. If near enough, and not too near, they perform straight or direct motion only. After being raised from the ground, as in walking or trotting, and during their descent in the act of stepping they need not describe any rotation inward in order to be brought underneath the centre of gravity, for they are already sufficiently below the superincumbent weight, nor do the shoulders and chest require to be thrown outward; the step is consequently smooth, the body is never off its balance, and all rolling action is thus avoided. In the gallop, too, where the chest is narrow, there is neither loss of time, nor useless expenditure of muscular power connected with width and looseness of action, but the limbs play evenly in parallel planes or lines of direct onward motion, and, so far as speed is concerned great advantage is gained.

A too-narrow chest, however, is about the greatest of evils; it is sometimes so unduly contracted, and involves other defects so slightly counterbalanced by any advantages, as to render many horses of light and even of heavy breeds completely worthless. How many horses accounted well-bred, [i. e. partaking largely of the blood of the race-horse,] after proving useless for other purposes, find their way, while yet young, into our street coaches! We see the poor creatures, with broken, tottering knees, bruised inside the shank and fetlock, occupying all city cab stands, and hanging their heads to the ground as if broken-hearted. When a very narrow chest is also very shallow in depth from above to below, the fore-legs come too closely in contact, or, as a popular expression is, "they seem to grow out of one hole." There is also another serious defect in a narrow chested horse; owing to the ribs not descending sufficiently between the elbows, and a deficiency of muscle over the breast-bone, the elbows turn inward, and sometimes stand under the breast. This causes the toe to turn outward; every time a fore-limb is lifted from the ground, the foot and flank bend inward, but the knee outward; and as the foot approaches the ground again, it is apt to strike the opposite fetlock. By standing some distance before a horse with this kind of action, so as to watch his gait when walked or trotted towards us, the fore-legs and feet seems

actually plaited or folded over one another at every step. In a rapid trot this involved action becomes confused, the animal is apt to strike the foot of one leg against the foot, fetlock, or shank of the leg opposite and may come down at any moment. More or less turning out of the toes is often seen in race horses, especially among second class animals; when the turning out is not very marked, and the fore-legs are not too close, it is usually accounted no great defect, when speed is the only object, and where little weight is to be carried. On the other hand, where the fore legs are almost close together, and the toes are widely everted, we may be sure the chest is narrow and shallow to an injurious degree. In making these observations I may remind you that many cases of everted toes and interfering limbs depend upon malformation of the fore-legs, and not upon defective formation of the chest.

**GEOLOGICAL FEATURES AND SOIL OF CANADA.**

*(From Hogan's Prize Essay.)*

The general features of Canada exhibit a granitic country, with occasional calcareous rocks, of a soft texture, and in horizontal strata. The calcareous region extends in a line north-west beyond Lake Michigan, as far as the sources of the Mississippi, and thence to the great range of the Rocky Mountains:

All the great lakes are placed in the line of contact between two vast chains of granite and limestone. At the narrowest part of Lake Winnipeg, where it is not more than two miles broad, the western shore is skirted by calcareous rocks, while on the opposite shore there are still higher rocks, of a dull grey granite. In the Lower Province, particularly, the granite prevails, with clay and limestone occasionally. The north shore of the St. Lawrence offers a rich field for the mineralogist, and at the Falls of Montmorenci there is a dense bed of limestone, exhibiting deep fissures, which appear to confirm the account of the earthquake in 1663, of which so many traces are visible.

The granite is invariably found in strata more or less inclined to the horizon, but never parallel with it. From Quebec to Niagara the red slate is perhaps the prevailing rock. The subsoil around Lake Ontario is limestone on granite, real granite being seldom seen. On Lake Erie the strata are limestone, slate and sandstone; and at Niagara the stratum of slate is nearly forty feet thick, and almost as fragile as shale,—so much so, indeed, as to sink the superincumbent limestone, and thus verifying, to some extent, the opinion that a retrocession of the falls has been going on for ages. On Lake Huron limestone is found with detached blocks of granite and other primitive rocks. On the south shore of Lake Superior are sandstone, resting on granite, chalcedony, cornelian, jasper, opal, agate, carnelian, zeolite, and serpentine, with iron, lead, and copper imbedded. The north shore is of older formation, with vast beds of granite, and mines of copper.

An elaborate and highly interesting report recently presented by Mr. Logan, the Provincial Geologist, to his Excellency the Governor General, furnishes much valuable descriptive detail of the country between Montreal and Cap Tourmente, thirty miles below Quebec, having a length of about two hundred miles, gradually widening from Cap Tourmente, and having an area of about 3000 square miles.

"It presents a general flat surface, rising in many places by abrupt steps, (the marks of ancient