

gas in both vessels, the same temperature obtaining throughout its entire mass. For how could a difference of temperature result when no other action between the molecules is possible than their collisions with one another, collisions which cannot affect the molecule's kinetic energy (the kinetic energy of each molecule being the same according to our supposition). But if it is admitted that in the supposed case the two vessels will be filled uniformly with the gas at the same temperature throughout, it is also admitted that a portion of the gas was set in motion of translation without any work having been done.

The only objection that could be raised to the above reasoning is perhaps this: the gas, while compressed in the receiver, has motion of agitation and, after equilibrium is established upon a portion of the gas having entered the vacuous vessel, it has again the same motion of agitation, but while passing from the receiver into and through the vacuous vessel a portion of the gas had, in addition, motion of translation which must be superimposed on the motion of agitation. There thus seems to be here a plus of energy to be accounted for. But this objection can be met by considering more closely the three stages in time which the phenomenon of the expansion of a gas into a vacuum presents. First, in the compression chamber all the gas has only motion of agitation, then while traversing the vacuous vessel the respective portion of the gas has only or mainly motion of translation at the expense of its original motion of agitation; and lastly, on striking the walls of the empty vessel the incoming gas has its motion of translation reconverted into motion of agitation.

If the above reasoning is correct, it means that just as to set one gas molecule in motion of translation in a vacuum does not require anything else than its own motion of agitation (which will, I believe, be admitted by every one), so with a body of gas.

But if in the hypothetical case no change in the magnitude of the kinetic energy of the individual molecules is required to 'translate' (if I may use the expression) a portion of the molecules, why should it be necessary

in the actual case as understood on the basis of the kinetic theory? It is true that we observe here a redistribution of energy and a 'translation' of a portion of the gas, but this 'translation' would have taken place if there were no redistribution of energy.

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#### WILL-MAKING.

TO THE EDITOR OF SCIENCE: The ever-recurring contests of wills, the disputes as to their validity, their meaning in general and particular, the interpretation of their peculiarities and seeming inconsistencies, etc., are such a damage to private comfort and to the public welfare in the highest sense, that any means of lessening the growing evil must be welcomed by all concerned.

As part remedy at least, I would suggest the establishment by each state of a court or other properly constituted body, whose duty and business it should be, upon application, to consider and validate *during the lifetime of the testator* his will, which, after approval could be deposited with the necessary secrecy, as a thoroughly competent legal instrument. To change a will, the same process should be gone through again. This presentation, validation and placing on record should absolutely bar all actions designed to break or alter the will after the death or subsequent incapacity of the testator. The way in which the Torrens land-title has been instituted in some countries is, if not a precedent, an instance of the successful treatment of a kindred difficulty. An unbreakable will might turn out to be as great a boon as an indefeasible title.

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[It is said of Charles Darwin in the 'Life and Letters': 'He would declare energetically that if he were law-giver no will should be valid that was not published in the testator's lifetime.' It is not clear how a secret will could be validated in the manner suggested by Professor Chamberlain, but there appears to be no reason why it should not be possible to probate a will during the lifetime of the testator. Such legal and moral scandals as

the subversion of the intentions of Stewart, Tilden, Fayerweather and others would thus be rendered impossible.—EDITOR.]

#### SHORTER ARTICLES.

##### SLEEPY GRASS AND ITS EFFECT ON HORSES.

In the Pecos Valley of New Mexico a year ago, a ranchman told me of a strange kind of grass found in the Sacramento Mountains west of there which, from its peculiar effect on horses, is called 'sleepy grass.' He described it as differing from the locoes in merely putting horses into a deep sleep without other symptoms of poison.

The story had a far-away sound and made little impression at the time, but last September, as I was traveling along the crest of the Sacramento Mountains, it came back to me with a new interest.

We had made camp one evening in a beautiful park, bordered with spruces and firs, and covered with tall grass that, with its green base leaves and ripe heads loaded with heavy rye-like grain, offered a tempting feast to our hungry animals. The moment saddles and harness were off, the horses were eagerly feeding. A few minutes later a passing ranchman stopped his team and called over to us, 'Look out there! Your horses are getting sleepy grass,' and added, 'If they get a good feed of that grass you will not get out of here for a week.' We were not prepared to spend a week in that locality, but I was anxious to test the grass, so let the horses feed for a half hour, then brought them up for their oats and picketed them on some short grass on a side hill well out of reach of the sleepy grass.

The following morning just after sunrise the cook called my attention to the attitude of one of the team horses, saying there was 'sure something the matter with old Joe.' The horse was standing on the side hill, asleep, his feet braced wide apart, head high in air, both ears and under lip dropped, a most ridiculous picture of profound slumber. The other horses apparently had not eaten as much of the grass as old Joe, for they were merely dozing in the morning sun and showed signs of life in an occasional shake of the head or switch of the tail. At breakfast time the

others woke up to a keen interest in their oats, but old Joe, after being dragged to camp much against his will, preferred to sleep rather than eat, and after pulling back on his rope all the way down to the spring, refused to drink or even lower his head to water. My little saddle mare showed the least signs of the general stupor, so dropping behind with her, I woke the others up pretty thoroughly and brought them into camp on a lope. Later, when in the harness, the team traveled along steadily with some urging, but when we reached Cloudcroft and left the horses in front of the store while getting supplies, their heads dropped, and for an hour they slept soundly. Even my nervy little mare did not move from her tracks, but stood with drooping ears, paying no attention to the unusual surroundings and stir of a town. On starting again the saddle horses responded to the spurs with worried switches of the tail quite different from their usual manner, while the team paid no greater attention to the whip. For the rest of the day our progress was slow, notwithstanding which, the driver called my attention to the fact that the team, and especially old Joe, were sweating profusely. Our saddle horses would sigh with relief when allowed to stop for a moment, and we had many a good laugh at the flapping ears of my companion's horse—a large-eared, raw-boned cayuse which seemed to have lost all control of her usually erect ears.

That night we camped in another park-like valley where sleepy grass was abundant, but took care to picket the horses out of reach of it. They were hungry and all began to feed eagerly, but old Joe soon stopped, braced his feet and relaxed into forgetful slumber. The next morning when we went to bring them in for their grain all were fast asleep.

The stupor lasted about three days, and was too evident and unusual to be attributed to weariness or natural indisposition. We were making easy trips and the horses were in good condition. After it wore off they showed their usual spirit and energy, as well as appetite. The only after-effect was a gaunt appearance, apparently resulting from lack of