

be guided by them in our reasonings; but we need to verify and correct our reasonings by the careful study of history and of statistics. Economic research, they would say, quite as much as economic ratiocination, is our business; and by following it diligently we mean to give to political economy a truly scientific character.

Another doctrine of the new school will be more sharply questioned; that is, the doctrine that the sphere of the state in the development of the economic welfare of society may be, and should be, considerably enlarged. It is probable that the new school and the old school would agree in saying that the state ought never to undertake what can best be done by individual enterprise; but they would differ considerably in the application of this principle. Mr. Herbert Spencer, for example, would deny that governmental inspection of commodities offered for sale is in any case admissible; the late Professor Jevons thought that such inspection was in many cases necessary, and that sound principles of common sense would determine when such inspection should be required. Mr. Spencer does not approve of the factory legislation of England; Professor Jevons strongly defended it. The new economy insists that under the "let-alone" policy grievous wrongs are perpetrated, and that many of the precious fruits of civilization are going fast to decay; and it declares that when the weak are obviously suffering from the encroachments of the strong, political economy does not forbid, but commands, the state to interpose for their succor. Doubtless it is assumed in this contention that the government represents the intelligence and conscience of the people; that it is not merely "all of us," as Professor Sumner urges, but the wisest and best of us. If the old economy turn upon the new, demanding, "Is this, indeed, the fact?" the new economy will at once be confronted with its hardest question. For the solemn truth is that the representatives of the state, the people who frame and administer its laws, are not, in Professor Sumner's phrase, "all of us," since a great many of us have but little part in the matter; much less are they always the wisest and best of us; very often, indeed, they are nearly the foolishest and worst of us, and the expectation that the bad matters now let alone will be greatly mended by their interference is certainly ill-founded. This is the natural and obvious retort of the old economists when they hear the new economists saying: "We regard the state as an agency whose positive assistance is one of the indispensable conditions of human progress."

But the new economists will scarcely admit the conclusiveness of the answer. "If our government," they may say, "were always to be administered by officials chosen from among the least capable and worthy of our citizens, this objection might be final; but we decline to count on such a possibility. The intelligence and virtue of the nation have a right to rule the nation, and they have the power to rule it too. Intelligence and virtue are stronger than ignorance and vice. A government which represents the worst classes is a monstrosity. Nature abhors it, and will not let it propagate its species. A government which represents only the average wisdom and integrity of the land is a solecism. Government means direction, leadership, wise control; if it fail to supply these, it is a hindrance and a burden. The theory of democracy is not that the ruler should be no wiser than the average citizen, the blind leading the blind;—the theory is that when all hereditary rule is abolished, and the people are left free to form their own government, those who are the natural rulers will be chosen; and the natural rulers are the wisest and best of the people. Democracy rests upon the belief that when artificial restraints are removed, the free action of the social forces will bring to the top the elements that belong there. If democracy means anything else than this, it is a delusion, and will speedily abolish itself. We assume that it means this, and this is what we are determined that it shall mean. Civil-service reform and all the other movements toward the purification of government rest on this assumption. We expect the legislatures and the executives of this land to be not only far better than the worst, but considerably above the average of the citizens in intelligence and virtue; and therefore we maintain that we are not irrational when we ask, for the government that we are determined to set up, the right to exercise those functions which naturally belong to it. If any one answer, 'Set up your pure government first, and then ask to have its power enlarged,' we reply that one way to purify it is to lay heavier responsibilities upon it."

We are not authorized to speak for the new economists, and they may decline to adopt our defense of their position respecting the functions of the state; but it is a position which they will be summoned to defend. The questions they raise are of great interest, not only to political economists, but to all students of social science; and the discussions they promise to open, by means of the platform and the press, must aid in the formation of a sound public opinion.

## OPEN LETTERS.

### Some Recent Experiments in Hybridization.

THE wheat crop of the world is undoubtedly the most valuable commercial product obtained from the soil. The wheat plant is one of the oldest in cultivation. The Chinese recorded its culture as early as 2700 B. C., and it is one of the prehistoric plants, remains of wheat seeds being found in the ruins of the houses of the earliest lake-dwellers. While there are several races of wheat, and while these have been crossed producing hybrids, it has retained its true

character and been entirely independent of other plants since its culture began. Compared with wheat, rye is a modern plant. It is not figured on any Egyptian monuments, and seems to have been first cultivated in the Roman Empire about the beginning of the Christian era, though it may have been known somewhat earlier in Russia and Tartary. While these two commercial plants have been cultivated side by side for centuries, the first plants appearing to be true hybrids between them bore seeds this year in this country. Wheat and rye may have been crossed be-

fore, yet there appears to be no record of anything like the results here obtained. Having made a personal examination of the crossing of these two great plant races, the writer may be prepared to report the history and present aspect of this most interesting experiment.

A very slight examination of a head of wheat shows plainly how and why it has kept its race purity so long. The flowers of the common squash stand wide open. The wind or a wandering bee may carry the pollen from the male to the female, and fertilization be effected in the roughest and most simple manner. It is the same with the strawberry blooms and the flowers of many other plants, and as a result such plants are inclined to "sport" and exhibit many varieties. Wheat, on the other hand, is self-fertilizing, the pistillate and staminate portions of the flower being close together and inclosed in a casing completely protecting them from contact with pollen from any other flowers. The flower is practically shut out from all natural crossing, and the only way in which a cross can be obtained is to open the case protecting the flower and make a purely artificial crossing. In this way all the crossed varieties of wheat have been produced.

The first step in the experiment was to make an artificial crossing between wheat and rye. For the female plant a head of Armstrong's beardless white was selected, and the flowers were carefully opened and the stamens cut out with a pair of scissors while still green. Shortly after, when the pistils were in the best condition, pollen from a head of common rye was dusted over them and the casing carefully closed again upon the wheat pistils, and fastened by means of a paper ring. This was repeated three times on each of the flowers where the stamens had been removed. This was in the summer of 1883, and from one head of wheat ten good seeds were obtained. These were planted on the 29th of the following September, and in due time nine new plants appeared, grew, and lived through the winter of 1883-4. In the summer of 1884 eight of these plants produced good seeds, and one plant produced a few apparently sterile and worthless seeds. The experiment here divides into two sections. The good seeds from the eight plants were planted in September, 1884, and produced many strong and healthy plants that survived the winter and bore this summer the greatest variety of wheats, some beardless, some fully bearded, some of one type and some of another, but all more closely allied to wheat than to rye. The result of this experiment is interesting, and it will in the future be continued, the various kinds being divided and again cultivated to see if the new types will be permanent. This portion of the experiment needs no further discussion, as the other branch, with the plants springing from the apparently sterile or worthless seeds, is of more interest. One of the original nine plants produced fourteen heads giving seventeen shriveled and narrow grains. The plant exhibited some of the features of rye, and this led to the hope that the seeds might germinate. The seventeen seeds were planted September 29, 1884, and fifteen plants grew up and safely passed the winter, two of the plants having been accidentally destroyed. These fifteen plants in July, 1885, presented a most curious appearance and bore heads of wheat closely resembling rye. The average height of all the plants was three feet five inches, the tallest plant being four feet

high. The best plant had thirteen heads, the poorest only two heads. There were one hundred and seven heads in all, or an average of seven and two-fifteenths heads to a plant. All the heads produced more or less seeds, and fifteen seeds selected, one from each plant, appeared to be in every respect good and perfect seeds. Of these, five were larger than the largest wheat, and three were larger than rye and closely resembled rye in shape. As a whole the seeds appeared to be wheat and yet had somewhat the shape of rye. No experiments were made to test the flouring qualities or taste of these seeds. That must come later when more seeds can be obtained.\* The point of interest lies in the fact that good seeds that resemble wheat were obtained from plants that had all the distinctive features of rye plants. An examination of these fifteen plants showed the following points:

1st, size and strength of stem and glaucous (or blue) color; 2d, tomentose appearance of stem or fuzziness of stem just below the heads; 3d, the heads were larger and narrower than wheat, and had more spikelets, being an average of twenty-six spikelets to each head; 4th, the glumes were marked more like rye than wheat, and the heads were bearded more like rye than wheat. In one head there were sixty-seven glumes, thirty-four on one side and thirty-three on the other. These features of color, bloom, shape, and character of heads seem to indicate that the plants followed their rye or male parent. They were considered by experts to be rye plants. The seed, on the other hand, is more like wheat than rye, and plainly not rye.

The object of this experiment is to see if a hybrid plant can be produced that will give seeds as good as wheat and yet be as a plant like rye; that is, a plant that will grow where wheat will not, or in fields exhausted by wheat, and will be as hardy as rye and ripen its seeds earlier than wheat. The fact that the young plants survived one winter is something, and the seeds certainly ripened earlier by several days than the original Armstrong wheat. At the present stage of the experiment, plants giving good seeds and having all the features of rye have been obtained. In other words, wheat has been produced from plants plainly not wheat. Whether the future plants will retain this combination of plant and seed characteristics remains to be seen. The experiments have been conducted with the greatest care, and the result, even at this point, is both interesting and of the greatest promise. Should the future plants give good flouring wheat, and have the good qualities of the rye plant, it may prove of the greatest benefit to the leading cereal crops of the world.

*Charles Barnard.*

#### A National Conservatory of Music.

FROM time to time there have been efforts made by lovers of music and others to establish a National Conservatory of Music in New York. For one reason or another these efforts have failed, and until within a very short time it looked as though there would be no individual, or collection of individuals, with enthusiasm or money enough to carry such a scheme through to successful completion. But while we were regarding the establishment of a national conservatory as a thing in the very distant future, it was nearer realization than it had ever been before, and all through the