KUBANKA AND SAXONKA WHEAT.

IN the *Gardeners' Chronicle*, vol. xi., p. 652 (May 24, 1879), appeared an account of my first year's experiments with Kubanka and Saxonka Wheat. It will there be seen that specimens of these two varieties in ear had been furnished from Samara, in Russia, by request of Dr. Asher to Dr. Charles Darwin, for the purpose of testing the opinion that Kubanka grown repeatedly on inferior soils assumed the form of Saxonka. The specimens were put into my hands for experiment.

I continued my experiments in 1879 with my own seeds of the previous crop. I had planted rows of these Wheats in the garden on October 24, 1878, but although some of the seeds germinated, none of the plants survived the severe winter.

The snow lay so long in the spring of 1879 that it was not till March 31 that seeds could be planted. At this date a row of Kubanka and a row of Saxonka were put in alongside of each other in the garden, of the best seeds of crop 1878. The Saxonka plants became much stronger than the Kubanka, and produced three or four times as many tillers, but owing to the extreme wetness and slowness of the season no flowering took place till so long after the usual period that it was then evident there would be no fruit, and that the experiment would be of less value for its intended purpose than had been expected. The plants were also attacked by red-rust. But although fruit was not here produced, the fact was shown by these two rows that no change had taken place in the character of the respective ears; the Kubanka remained a thickset ear, however much dwarfed in size, and the Saxonka remained an ear closely resembling, or identical with, "Fern" or awny spring Wheat.

Beside these rows a little plot was sown on April 2 with a mixture of 106 seeds of each of the Wheats, broadcast. The resulting plants were so poor and diseased, carrying no fruit whatever, that it was useless to attempt any estimate of the quantity of any part of them. It was noticeable, however, that the unfavourable conditions which had killed many of the seeds and stunted the whole crop had not converted all the plants into the Saxonka form. There were more Saxonka plants than Kubanka, but there were fewer of each than 106.

On April 16 I mixed 350 troy grains of the Saxonka which had grown amongst Oats the previous year and was not rusted, with nearly the same weight of unrusted Kubanka and as much more partly rusted as made the Kubanka double the weight of the Saxonka, or 700 troy grains, and sowed the whole broadcast in a corner of a field ploughed out of grass.

As in the former cases the pollination came far too late to admit of general ripening. The Saxonka here also showed the highest vitality, for although a double weight of Kubanka had been sown, the number of Saxonka plants greatly exceeded the number of Kubanka. When cut in the beginning of November, and separated from each other, the Saxonka plants weighed nearly two-and-three-quarter times as much as those of the Kubanka. Some of the Kubanka plants were better than any of the Saxonka, reaching a length of nearly 5 feet, carrying ears 3½ inches long, having ten ranks of spikelets on each side, some of which showed four fertile florets or grains, and giving sixty and seventy grains to the ear; the best grains weighing about half a grain troy.

The best plants of Saxonka were 4½ feet in height, with ears of eight ranks of spikelets, each for the most part carrying three grains, and each grain averaging in weight about ·42 of a troy grain.

In both varieties of this plot the seeds are sufficiently matured, though the latest sown, to be available for the production of another crop; but in the Saxonka the process of ripening is the most advanced, arising from the fact that the Saxonka is more of what is called a spring or summer Wheat than the Kubanka. All Wheats are able, in various climates, more or less to accommodate themselves to autumn or spring sowing; but in some sorts the process of assimilation is naturally more rapid than in others, and hence the classification into winter and summer Wheats. That such a classification exists may help to point out that the trimestrian Wheats, probably of the old Roman farmers, have not been evolved in recent times. But although Wheats have been loosely classed as summer and winter some are equally adapted for autumn and spring sowing; and the separation of so-called species is really made, not in reference to the time of seeding, but in reference to the character of the spike. Whether a persistent sowing of a spring Wheat in autumn has ever changed its physiological aptitudes is very doubtful; certain it is that no such treatment has demanded a new description of the spike.

Now, what are the conclusions to be drawn from the present experiments? Where the two rows of different seeds were sown separately and produced plants like the plants from which they had been derived, the inference is inevitable that no transmutation had taken place. Where two of Kubanka to one of Saxonka were sown as a mixed crop, producing eleven of Saxonka to four of Kubanka, uncorrected imagination might conclude that many of the Kubanka seeds had produced Saxonka plants. But we know as a fact of the case that if the Kubanka seeds had been equally vital with the Saxonka, there should have been about double the number of Kubanka plants which there were of Saxonka; in reality there were less than half as many. And if in this experiment a certain number of Kubanka seeds produced Kubanka plants, while in another experiment all the Kubanka seeds which grew were certainly known to have produced Kubanka plants, it is more probable that the Kubanka seeds which did not produce Kubanka plants died, than that they produced Saxonka plants. So far as the logical elements of the case go, it is not absolutely certain in the case of the mixed sowings that some of the Kubanka seeds did not produce Saxonka plants, or some of the Saxonka seeds Kubanka plants; but it is certain that there were more of Saxonka seeds sown than there were of Saxonka plants reaped, so that no transformation was needed to produce any one of the Saxonka plants; and thus certainly the best conclusion is, that the predominance of Saxonka has here arisen, not from transmutation of Kubanka, but from the higher or more immediate vitality and fertility naturally inherent in the cells and protoplasm of the Saxonka embryo, under the circumstances.

Dr. Asher, who is well acquainted with the phenomena here in question, and would only have proposed them for solution for good reasons, in some observations he has done me the honour of making on my first year's experiments, objects that "Kubanka Wheat, far from being less prolific than Saxonka, is, on the contrary, the most prolific of all known kinds of Wheat; eight ears from one grain, and forty grains to each ear not being very rare in favourable years on the proper soil." I have no doubt that these facts are strictly correct, some of my own Kubanka plants giving a similar return. Kubanka Wheat can hardly be distinguished from the old Pole Rivet Wheat of England.* Many ears of this variety grown by me show from 80 to 100 grains, the plants carrying from six to twelve ears. But this is as nothing to the potential fecundity of a seed of almost any variety of Wheat. Planted at the proper depth, on the proper soil, in a favourable year for tillering, a seed of Wheat will give 3000 or 4000 returns. But the present contention is, that the inferior or half-exhausted soils in Russia or elsewhere are not able to develope so high a fecundity in Kubanka Wheat as in Saxonka, which makes less demand upon physiological agencies. For centuries of the worst Scottish agriculture, much of the soil was unable to produce anything but the "small Oat" (Avena strigosa); and there was just the same reason probably for supposing that the "great Oat" (all forms of Avena sativa) had then changed into the small Oat, as there is for supposing that Kubanka Wheat changes into Saxonka.

Dr. Asher makes makes various other objections to my hypothesis for the intrusion and predominance of Saxonka. He informs me that the appearances in question were observed by him on the land of Count Orloff-Davidoff, one of the most prominent agriculturists among the landed proprietors of Russia; that the field he saw was quite a mixture of Saxonka and Kubanka, although the intention of the superior tenant, a highly intelligent and industrious German, certainly was to produce only Kubanka, and everything had been done to attain that aim; that some of the more intelligent Russian landowners, in order to prevent the degeneration of Kubanka, choose after the harvest the finest ears one by one, employing their most careful people for that task, and as the aspect of Kubanka and Saxonka ears differs very widely, errors on any extensive scale are quite out of the question, and yet these agriculturists are obliged to renew their seed at least every five or six years by purchasing from the finest virgin steppe land; and further, that the grain which in St. Petersburg and London is called Saxonka, is in Samara called "Peresod," signifying degenerate. The very name of Saxonka, it is added, is an important fact, since it appears from a careful study of the history of the German colonies in Russia that at the time this word was first used these people could not possibly have developed any European Wheat; Saxonka certainly being the development of a Russian grain which the German colonists found useful.

To the claims of transmutation, as thus stated, I have given a careful consideration. But I cannot concede that the Russian agriculturist is any better able to perpetuate an unmixed stock of any Wheat or other corn than the Scotch agriculturist; and no field of Scotch grain is other than a more or less mixed crop of various kinds. No care on the part of the farmer can prevent the shedding of grain by gales before harvest; and where, as in some parts of Russia, this shedding is all the seed of the following crop, the problem becomes too complex for observation to follow. The selection of Kubanka ears referred to, even were it carried the length of forming sufficient stocks to sow whole fields, has always to be weighted with the carelessness and inattention of servants. This hopeless method of improving seed corn is recommended by Columella, who tells us it was also approved of by Celsus (B. ii., ch. ix.). The former tells us likewise that "all common Wheat after the third sowing on wet ground changes into Siligo." And Henry Best, in his *Rural Economy of Yorkshire* (1641) informs us that among the "long read" Wheat "oftentimes" came up "a Wheate called driven Wheate having noe awnes," which hindered the sale of the main crop; showing the same facts as have given rise to the transmutatory solution. In my own small crop of a few handfuls, after having selected the Kubanka from the Saxonka, I found that three mistakes had been made. And the very fact that the task of selecting the proper ears can be set even to the most careful people, shows that the mixture is intimate and the difficulties greater than the determination to overcome them. *A. Stephen Wilson.*

(*To be continued.*)

* *Lawson's Manual* does not mention this Wheat by the name of Kubanka; but perhaps it is what is there called "Turkey Wheat," and by the French "Blé gros Turquet,' "Polard rouge bleu';" "Gros ble rouge," &c., and may be what Tusser calls "Turkey or Purkey Wheat," which he says "many do love because it is floury." The great number of names which every form of Wheat has had from the time of Theophrastus utterly confuses inquiries like the present.

ORCHARD HOUSES.

THE general failure of hardy fruit crops for the past two seasons has already aroused healthy symptoms of practical action being taken, which it is hoped will be prosecuted with energy and vigour until some scheme has been formulated by practical horticulturists which will give a better return for material and labour than the meagre crops of 1878-79. The subject is a comprehensive one to deal with. It necessarily embraces a variety of homogeneous circumstances, which require experienced discrimination to thoroughly unravel, so that no case will be treated otherwise than upon its own particular merits.

Orchard-houses may now be called an established institution in horticultural circles. They will soon be more: they are destined before long to become convalescent homes for recruiting the shattered energies of thousands of fruit trees which are either barren or are fast languishing towards decay. The form an orchard-house should take, its position, and other questions relative to structural formation, are now attracting attention, and it is well that the subject should be discussed for the benefit of those who rely upon the horticultural Press for sound advice and information.

With regard to the size an orchard-house should be, I rather fancy that should be left in the hands of the occupier or owner to decide. The size of the house ought, however, to be in proportion to the size of the garden, exactly as the grounds surrounding a mansion or the conservatory should bear a relative proportion to the size of the mansion itself. An exception would, of course, arise in the case of market growers, where appearance would be set aside in favour of utility. Coming nearer to the point an orchard-house may be made of great benefit in small gardens which are not enclosed by walls. It may be made to

having a judiciously selected site, for of all botanic gardens now in Britain only one of any importance, viz., that of Liverpool, is situated within the influence of the west-coast climate, and even compared with it many much more favourable sites could be got along the western coasts of Scotland. As showing that this notion of introducing the hardier plants of New Zealand has been one of some standing with me, I may mention that at a meeting held in 1863 to consider the best place for sending Dr. Robert Brown to as a collector, on the question being put to me by George Paton, Esq., of The Carnies—afterwards the Lord Justice Clerk—I unhesitatingly replied, "To the great western mountain range of the Middle Island of New Zealand;" which was met by the objection "That place has never been thought of; and besides it cannot be got at as there is no shipping or trade connected with it." The finding of gold has since however brought both shipping and trade to it; and yet its native flora is almost as little known to British culivators as ever.

In addition to the scientific names of New Zealand plants in the preceding list, those applied by the settlers and natives are also given, so far as they are known, as by such names collectors can get any kinds of seeds they may be in want of, with more ease and certainty than by using the botanical names only.

A CONSERVATORY AND BILLIARD-ROOM.

The illustrations (figs. 32 and 33) represent the plan and interior view of a conservatory and billiard-room now approaching completion at Theydon Grove, Epping, the residence of J. Finlay, Esq., and we commend the design to the attention of our readers as exhibiting a very convenient, handsome, and appropriate arrangement of these two ornamental and luxurious additions to a gentleman's mansion. It will be seen on reference to the plan of the conservatory, and the view, which is shown as it would be seen by a person standing at the door of the drawing-room, that the main pathway is exactly opposite the drawing-room door. It is about 50 feet long, and terminates in a bay, which faces a terrace walk in the grounds. This walk is of considerable length, and leads to a small artificial lake, the whole forming a splendid vista. The desire to preserve and augment the effect of this vista led to the somewhat peculiar arrangement of the conservatory.

The main roof runs the whole length of the building, and the ornamental lantern which surmounts it is central with the pathway below and the terrace, while the east front has three domed roofs—the middle one, which embraces the entrance from the east terrace, being rather larger than the others. The various gutters are supported by handsome iron columns with enriched caps and bases and ornamental brackets. The interior is tastefully laid out with stages and beds, baskets hang from the roof in various positions, while directly opposite the east terrace is a small pond and fountain, and an archway in rock-work for Ferns.

At the north end of the conservatory and close to the drawing-room door is the entrance to the billiard-room, a spacious and highly ornate apartment, exhibiting several novel features. In the first place, the wall between it and the conservatory is pierced by several windows of plate glass, the central one, which is very large, having a particularly pleasing effect. This window on the conservatory side is surrounded by the rockwork archway before mentioned, so that a person standing in the billiard-room, or seated in the recess on the west side, commands an uninterrupted view through this window, under the archway, past the fountain, through the conservatory, on to the east lawn. At the south end, and divided from the billiard-room by a handsome colonnade, is a raised smoking gallery, to which is attached a lavatory, &c. We understand that the billiard-table is to be placed on a brass railway flush with the floor, so that it can be wheeled into the recess on the west side of the room, thus converting it into a very handsome and convenient ball or concert-room. In either of these cases the smoking gallery would be utilised as a place for the band or orchestra. It is also intended, with a view to this, to place an organ in the recess at the back of the gallery. The buildings were erected by Messrs. J. Weeks & Co., of Chelsea, by whom they were also designed.

KUBANKA AND SAXONKA WHEAT.

(*Concluded from p.* 108.)

At what time this form of Wheat was first called Saxonka I do not know. I have compared it, in both the white-chaffed and red-chaffed ears, with awny spring Wheat, and they do not differ from each other in the very slightest particular, but seem to be both one variety.

No one regards our common spring Wheat as a degenerate form of Wheat. That the farmers of Samara call Saxonka a "degenerate" Wheat may point to what they believe, but no more proves that it is derived from Kubanka than the analogous belief that Darnel (Lolium temulentum) is degenerate Wheat, proves a genetic relationship between Wheat and Darnel. Nor do the experiments of Professor Buckman with one of the varieties of the wild Oat (Avena fatua) seem to possess any higher value. The cultivation of other experimenters has not turned the wild Oat into a "Tartarian" or into a "Potato Oat." The wild Oat has been as long in cultivation as any cereal Oat (see Virgil's *Georgics*, lib. i.), but it has as yet retained its characteristics, frequently throwing up fifty stalwart culms from one seed, carrying many thousand returns, and maintaining such a firm hold of its cosmical environment as to completely defy extirpation.

Why the Saxonka form of Wheat should be regarded as degenerate is certainly not obvious from the plant itself. The quality of a Wheat is relative; there is no general standard of comparison. If a variety called A produces 4 qr. to the acre, and a variety B produces 6 qr., B is the better Wheat for the farmer. But if A produces a higher percentage of fine flour than B, then with the miller A is the better Wheat; and again the Wheat whose flour absorbs the greatest weight of water is probably the better Wheat in the estimation of the baker. With certain chemists the Wheat which contains the highest proportion of flesh-formers is best, while with those people who do not wish to become fat, and desire a pleasant gusto, the Wheats having high percentages of starch are better.

Now in the London market Kubanka has sometimes been regarded as a good Wheat, and sometimes as inferior to lighter Wheats. In the minutes of evidence of a select committee of the House of Commons on the "Sale of Corn," of date 1834, an "agent for the purchase of foreign grain" states that the Kubanka Wheat, weighing 63 lb. to 64 lb., is worth 25 per cent. less than Dantzic Wheat weighing 60 lb., the reason being that the Dantzic gives whiter flour. Again, in a work on *Wheat*, published in 1865, it is stated that Kubanka under proper management yields flour of great strength, and that it astonished the London millers and bakers, producing 108 loaves to the sack.

We see, therefore, that this question of transmutation is only confused by being looked at in relation to fluctuating opinions. If a plant were to become fitter for the support of man, that would be no proof that it had cosmically improved; or if it became less fit for human purposes, that would be no proof that it had cosmically degenerated. The question is not whether a plant has improved or degenerated, but whether it has changed. Evolution is not the slave of humanity. It is simply the collective process going on about us, of which we learn to take more or less advantage. Whether, therefore, Saxonka Wheat is a degenerate Wheat as compared with Kubanka, under any assigned category, is not a question of evolution, and any solution of it would throw no light upon the real inquiry, which is simply this, Did Saxonka Wheat come from Kubanka seeds? The various forms of Wheat have been wandering over the face of the earth and mixing familiarly with each other from immemorial time. No pure stock of Kubanka—(Is this name from the river Kuban?)—of any extent ever came into Samara or any other country. And as the complete proof of transmutation would be extremely easy, requiring only that a Kubanka seed, planted beside a pin to mark the spot, shall be surmounted by a Saxonka plant, or some element of it, no amount of collateral plausibilities can be accepted.

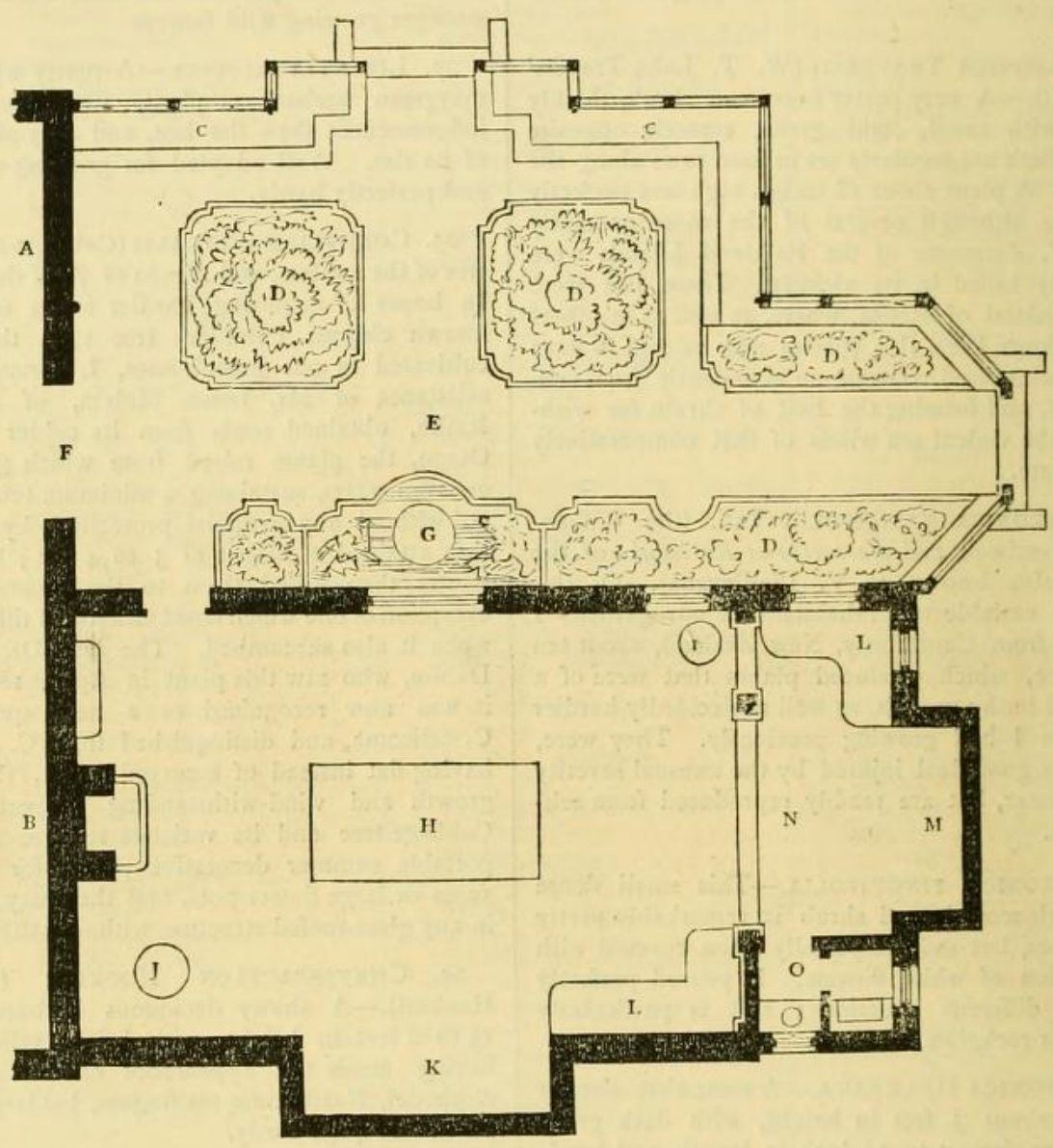

FIG. 32.—GROUND-PLAN OF A CONSERVATORY AND BILLIARD-ROOM AT THEYDON GROVE.

REFERENCES TO PLAN:—A, Conservatory; B, Billiard-room; C, Stepped stages; D, Beds; E, Ornamental tile floor; F, Glass door leading into Drawing-room; G, Fountain, with rockwork on each side; H, Billiard table; I, Cues; J, Card table; K, Recess for seat or table; L, Seat; M, Recess for organ; N, Raised smoking gallery; O, Lavatory, &c.

When the history of the cereals is written, the chapter on transmutation will embrace opinions from all ages. Parkinson, reviewing certain ancient notions (*Theatrum Botanicum*, *Cerealia*), tells us that "Galen writeth that both he and his aged father, who tooke delight in husbandry, having sowed both Wheate and Barley very well cleansed from any other seede, of purpose to prove whether they would change their natures into Darnell and haver-grasse, or whether these were natural seedes of their owne kinde, found that much Darnell rose among the choise Wheate, and much Ægilops or haver-grasse among the Barley; whereby it seemeth he doth confirme that current opinion, that these and other graines and seede will change into others either better or worse; but surely I could never meete that countrie or husband man that could certainly prove it (although some have averred verbally and earnestly) that there was any such metamorphosis."

In what direction we should search for an explanation of higher fertility in one form of a cereal or other seed, than in some other closely allied form, may not be easily determined. But there can be no doubt of the existence of the principle in animal as well as vegetable life. I have seen the two-rowed variety of Barley called Italian, which has a thick-set ear, planted in the same conditions as the two-rowed variety called Chevalier, which has a thin-set ear, and the latter producing from fifty to eighty ears, while the former did not go beyond twenty and thirty. Higher fertility is therefore a *vera causa* in the supplanting of one form of Wheat by another, and may be seen in operation and studied in the lifetime of a man.

I have thus placed high fertility, or a high reproductive power, as the chief cause why one form of Wheat, in certain circumstances, exterminates other less prolific forms, and seems to transmute these other forms into its own. But doubtless there is sometimes a concurrence of favouring causes. In the case before us, the Saxonka form of Wheat is not only more prolific, except on rich virgin steppe land, it also comes sooner to maturity; the seeds are more easily shaken out of the pales by wind, so as to produce self-seeding; and it has the capacity of living on less food than the Kubanka. It is brought to the front, not by the transmutation of other forms, but by that combination of cosmical forces which selects one line of vitality in preference to another; life is most prevalent on the easiest lines of vitality, and the more prevalent forms of life are probably those which are most in harmony with current rearrangements of cosmical materials. But whether the relationship between one form of vegetable life and other forms is a biogenetic or a cosmical relationship—that is, whether one form of life originates from other forms of life, or whether those causes which are capable of originating one form of life are capable of originating all forms of life—is not settled by the acceptance of evolution.

In all probability the causes which bring about whatever change from one form to another does actually take place, are dependent on the cosmical processes in current operation, and make no appreciable show even in the lapse of many human generations. We know that the form of the ear of a Wheat already exists in the embryo from which it is to grow. In the forty or sixty embryos standing in a Kubanka spike coming to maturity in the autumn sunshine, exist forty or sixty microscopic ears of the Kubanka form and not of some other form. And if they are there in virtue of existing cosmical forces, whence are the forces which shall alter them? The form of a plant cannot be permanently altered but by the alteration of that collocation of cosmical influences which gives it whatever statical permanence it possesses. A mere physiological amplification or deduction, a physiological resultant or sum, is not a biomorphic evolution. We have not yet got beyond the notion that such periods as our seasons, or the long journey of the major axis of our planet's orbit round the heavens, are mere dead cycles. There are no cycles, and the motions taking place are but marks of the life of the evolution which has brought our Wheats to their present form. Such experiments as the present have no philosophical interest except in whatever degree they help to clarify our vision as to the current creative processes going on around our doors.

It is now twenty-five years since, in a small book called *The Unity of Matter* (1855), I made the contention that the interpretation of Nature logically demands that the phenomena of sight, like the phenomena of the other senses, should presuppose, not a specific ether filling all space, but an appropriate form (an ethereal form) of the common fund of matter which appeals to other senses than vision; and that consequently a transfer of matter from the great solar decomposition into the structure of the planets, for the very purpose of carrying them to higher stages of evolution, is the very work which is on hand, the very explanation of what all this cosmical stir is about. The planets are not dead and finished supports of living plants and animals, merely going round the sun, like the hands of a clock, to tell the number of the years; they are living organisms and are being carried round, not by barren projections, but by the very forces and forms of matter which require this carrying round to work out the evolution of planetary globes. The evolution and the life of plants and animals are intelligible only on the assumption of the current evolution of their platform. The earth does not go round the sun for nothing or by way of holiday; it is carried round the sun by forces perpetually present, for the very purpose of being enlarged from the actual materials thrown out in the sun's decomposition. And these contentions do nothing but complete the logic of the sense of seeing. But never till this view becomes accepted science is it possible that our eyes should be opened to the creative drama now being played before us. And never can this view become accepted science, till the curtain of a specific ether with its fictitious scenery be drawn aside, and it be seen that the common matter which appeals to sensation has forms which appeal to all the senses, necessarily demanded by the very fact of their evolution. *A. Stephen Wilson, North Kinmundy, Summerhill, by Aberdeen.*

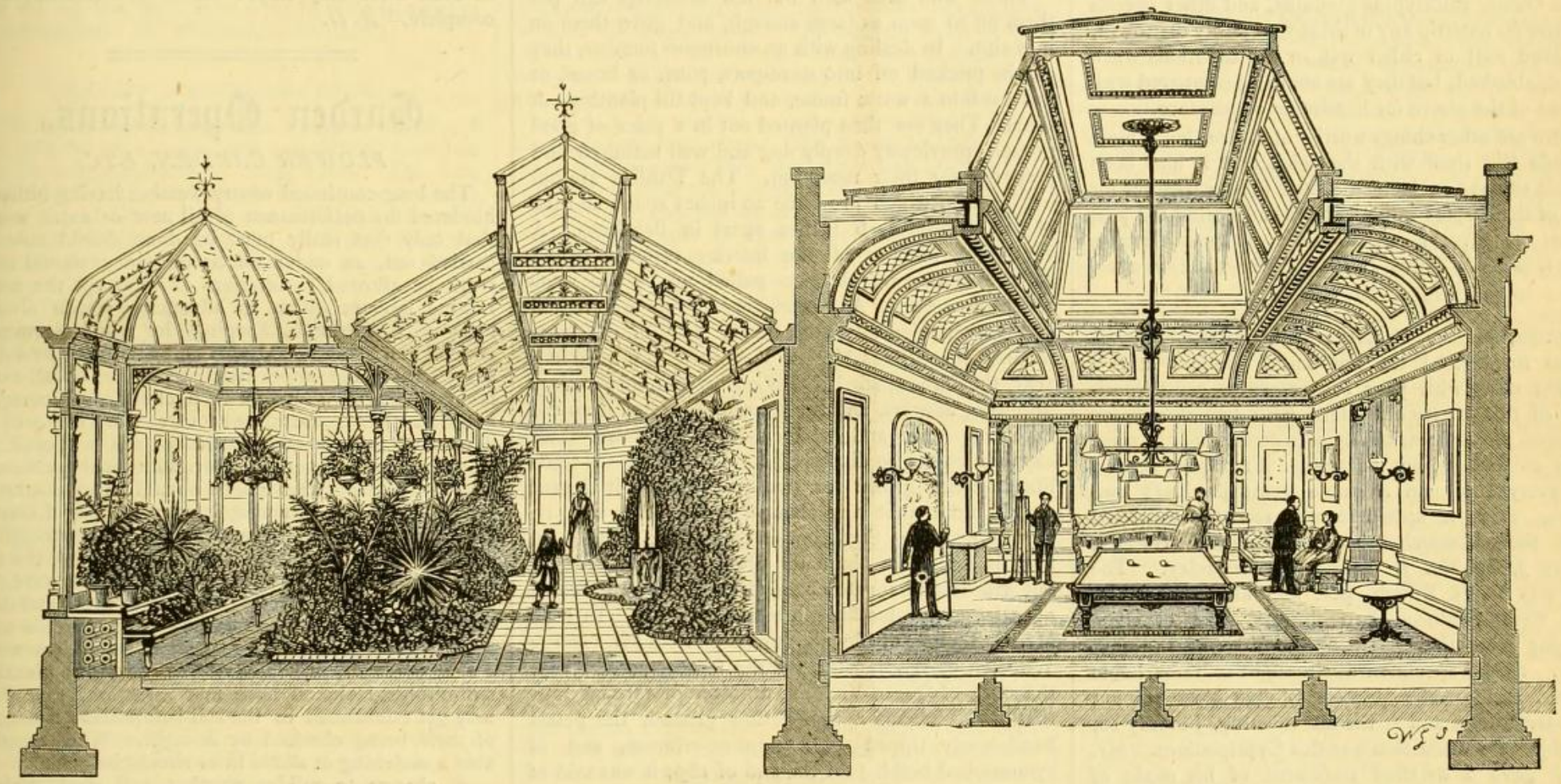

FIG. 33.—CONSERVATORY AND BILLIARD-ROOM AT THEYDON GROVE, EPPING. (SEE P. 172.)

Foreign Correspondence.

KING WILLIAM'S TOWN, SOUTH AFRICA: *Dec.* 27, 1879.—*Grevillea robusta.*—We have for about four months experienced a very severe drought, which still continues, and the manner in which a well-known favourite of the sub-tropical garden at home has withstood such a trial induces me to say a word in its favour. I allude to Grevillea robusta, of which we have some fine specimens from 40 to 50 feet in height of about ten years' growth. Notwithstanding that they have been for some time covered with their very showy orange-coloured racemes of bloom, and are now heavily laden with seed—the most exhausting period of a tree's existence—they do not appear to be suffering in the least, their truly elegant and graceful foliage having that rich dark-green hue which is characteristic of robust health, though they have no artificial watering, and are growing at too great a distance from any water for the roots to reach.

I think it is certainly worth planting extensively in this, at present, desert-like country, which, but for the long-continued droughts we suffer from, would be one vast garden. I do not know what is the quality of the timber, but if any of the readers of the