is run in. Some consider such introducing safe only after the nuclei have their queen-cells capped, which will be from three to six days after they are formed; but I have always endeavoured to get a young queen in some time between twenty-four and forty-eight hours after formation. I have, in many instances, failed to have my queens on hand as soon as I intended, and have this season run queens into nuclei of all ages, from six hours to as many days, and I think not a single failure has beset our efforts. We have found about one in fifteen of our nuclei queenless; but as we seldom look after these matters previous to a week after introducing, and have in no case found queen-cells on the combs, I infer that these queens were accepted, but were lost on their mating trip, or otherwise, afterwards." This question of introducing virgins will come before us again presently; but we have yet to discuss one or two points in reference to the selection of our breeding stock.

I remember well one of the most, if not the most, scientific of British poultry-fanciers, remarking that he had long desired to establish a breed with a special type of feather. "Give me a bird," said he, "with but one feather such as I seek, and I shall not despair; but that bird has not yet been found me." The idea here involved is of general application to all animal and vegetable races. Any peculiarity, if of service, may, by natural processes, continued through long periods, become settled into a specific characteristic, or may be quickly intensified by careful breeding, man practically leaping to the goal of natural selection, and bridging over what ages upon ages could only have

accomplished; but the point now before us is: What are the peculiarities that we require in our bees? All are agreed as to the desirability of great fecundity; stamina and longevity; gentleness and adherence to the comb under manipulation; great honey-gathering capability; an indisposition to swarm; good wintering qualities; good comb-building; solid and impervious sealing to honey; and a compactly kept brood-nest. But there are other points, which are of relative rather than absolute importance, such as purity of race, colour, and markings, both of queen and workers; and, lastly, size. It is clear that some of the first are mutually dependent; *e.g.*, fecundity and honey-gathering capabilities are inseparably connected, and longevity and wintering qualities go, necessarily, hand in hand. The special characteristics of the races, as such, will be treated of hereafter, while the question of hybrids or pure stock, and that of colour, must be settled by individual circumstances and tastes; although the latter has a practical application, in that light-toned queens are far more easily seen than are those that are dark.

The last point (size) is one upon which great misapprehension abounds. The idea that it is desirable to increase the dimensions of our bees is all but universal, and, since I have ventured, more than once, to stand alone in condemning it, I must give my reasons for so doing. *Apis dorsata* has been hunted up, although it is known to be a useless savage, simply because it is big, and that by the very persons who claim that the smaller hive bees are the best, in that they give their vote generally to the yellow varieties. Fortunately, it is in the very nature of things impracticable to "hybridise" our hive bees with *dorsata*, over which we may inscribe "*Requiescat in pace.*"

But it is still necessary to point out that the smaller the creature, the greater, relatively, are its powers, both for a mechanical and a physiological reason. First, other things being equal, as an animal is enlarged, its weight increases as the cube, and its strength as the square only, of the ratio of the lineal increase. Thus, if a man could be developed until his 6ft. stature became 18ft., his weight would be increased no less than twenty-seven times; while his muscles, because three times their former width and thickness, would have only nine times their former power. Such a man would be just able to stand; but if he were to stoop to pick up a pebble, he would be too weak to rise again to the erect posture. This aspect of the question is quite mechanical, and may be further illustrated thus: An ordinary lucifer match, supported horizontally at the ends, will bear about 7000 times its own weight suspended from its centre; but by enlarging it 240 times, it becomes a great baulk of timber, which would be broken by once its own weight similarly suspended. Here we have the reason why ants can build nests which, in relative size, utterly transcend anything bigger creatures can accomplish; why some insects can jump even a hundred times or more their own height, while the gazelle can, at a push, do twice, and man and the horse once theirs, leaving the elephant to disdain jumping, as unsuited to his ponderous dignity.

The physiological reason is equally striking. Creatures grow by transfusion of material in their living bodies, and the more solidity their tissues have, the more slowly does this transfusion occur. Some flesh-flies, in the earlier part of their larval state, will increase in weight two or three hundred times in twenty-four hours—a rate of development absolutely forbidden, by physiological and chemical laws, to creatures of larger proportions; for, other things being equal, as the size increases the rate of development must decrease. The inconceivably minute monad, weighing a fraction of a billionth of a grain, by absorbing nutrition doubles its weight and divides every four minutes. If food abound, and the fluid surrounding the creature be free of enemies, and not circumscribed, it, in the course of three or four hours, may produce in its descendants an amount of living, moving material exceeding the weight of the largest elephant; while the latter animal, with its digestive and assimilative powers stimulated to the uttermost, could only, in the same time, add a few ounces to the weight of its body.

The economics of the question must not be overlooked. In gathering from clover, it has been shown that about $\frac{1}{350}$th grain is secured at each visit. Let us imagine that our bee is enlarged twice, by which its weight has grown eight-fold. As it flies, carrying its large body from clover-bloom to clover-bloom, an amount of wear and tear is involved which is eight times as great as that accompanying similar movements in the normal bee. This wear and tear is replaced by food —of course, proportionately augmented, and which has to be deducted from the $\frac{1}{350}$th grain secured. The net increase to the stock is, therefore, less at each visit, in the case of the large bee, than in that of the normal one. The former, however, has the advantage of being able to decrease its return visits to the hive to unload, because its honey-sac is larger; but this is the only gain, and it is much more than counter-balanced by the fact that, with normal bees, eight independent gatherers would be at work simultaneously for only the same wear and tear that would permit of the efforts of one if the bulk were increased as supposed. Selection has gone on for ages regulating the proportions of the wondrous insect between those extremes in which the loss by excessively frequent returns to the colony, and the loss through excessive bodily weight, balance each other, and has thus given us a bee whose size yields the best possible results.

The botanical reason for desiring no alteration was expounded in Vol. I. Flowers and bees have been constantly interacting. The build of every floret is adapted to that of its fertiliser, and, could we suddenly increase the dimensions of our hive bees, we should throw them out of harmony with the floral world around them, decrease their utility, by reducing the number of plants they could fertilise, and diminish equally their value as honey-gatherers. Mechanics, physiology, economics, and botany alike, show any craving after mere size to be an ill-considered and unscientific fancy, for which it would be even difficult to find an excuse.

Attention has already been drawn to the fact (page 228 *et seq.*) that natural selection tends to develop the swarming tendency, while the bee-keeper's interest lies in checking this very tendency to the uttermost. It will be seen, from the plans suggested, that the eggs furnishing queens, in the hands of the expert, are scarcely, in any instance, laid by a mother surrounded in her stock by the swarming fever; and since (if I may be allowed a convenient but, perhaps, slightly inaccurate expression) the mental conditions under which these eggs are laid are likely to reappear, this is of the highest moment. Every faculty or propensity derives force from exercise, and diminishes in intensity by infrequent use. This is equally true of the organs of the body as of the instincts accompanying it. In our coal-mines exist eyeless spiders, the descendants of those carried down, probably, in the fodder of the horses, and which, in the darkness, long years since, had to secure their food by the exercise of the sense of touch. Their eyes, out of use, and never stimulated by the presence of light, have decreased in energy and size generation after generation, until we have their progeny actually devoid of the organ which circumstances had rendered useless. Similarly, if queens be raised, generation after generation, from parents which have never joined in a swarming expedition, and which have been strangers to the stimulus of the swarm fever, it is certain that the disposition to swarm will gradually all but disappear.

The compactness of the brood-nest is a point of more than trifling moment, aiding the bees in maintaining temperature, and the bee-keeper in preserving his brood and honey chambers practically distinct. It is the result, undoubtedly, of selection, and is not dependent upon the environment of the queen. On one occasion here a swarm was hived carelessly, and