

doubtless with more wisdom and less conceit.

The third and last rightful denizen of a perfect colony of the bees is the unsophisticated, stingless, but much abused *drone*—the male bee. He is well named, however, being a very liberal feeder with excellent digestive organs for honey, and with no duties whatever within the hive further than the incidental one of contributing by the presence of his cumbrous corporation to the animal heat of the hive. As to his natural longevity, nobody from Virgil to Huber, Langstroth, Quinby, Newman, Cook, Jones, *et alii* seems to know much about it. The matter not being invested with any importance, no investigator seems to have bothered his head much with it. So far as I could ever see, the drone seems to live and thrive admirably until he is either killed off by the workers, starved to death, or gallantly yields up his life in performing his sole function, which he invariably does in the performance of this function in the act of copulation. The drone, as Dr. Dzierzon established, comes from an unimpregnated egg—the virgin queen, and sometimes even workers, being able to lay eggs which will produce drones. As a rule, drones are found in colonies whenever they are needed, or likely to be needed to impregnate the young queens, which is usually during the swarming season and honey harvest. Though they are promptly ejected from strong colonies when not needed, and the honey-flow fails, they are tolerated in queenless colonies, and are sometimes wintered over. The drone is much larger than the worker, and his cell very protuberant, and in it he spends twenty days from the egg before he emerges.

As remarked at the outset, bee-culture made but little progress on scientific principles for thousands of years. It is only within the last half century or so that it has, under the magic talisman of science, fairly leaped forward like every other pursuit. The first great achievement was the application of the centrifugal force in the construction of the honey extractor, thus enabling us to get the honey in its purity out of the comb without injuring the latter, when it can be returned to the bees to be refilled. A German (Herr Von Aruschka) accomplished this, and thereby gave a great impetus to bee-culture. Indeed, the invention of the movable frame and the honey-extractor completely revolutionized the *modus operandi* of bee-keeping. As to who is really entitled to the credit of inventing the movable frame, there is some uncertainty and a conflict of claims. The truth seems to be that some three or four different persons are fairly entitled to credit—each, it would appear, having conceived and developed the idea, more or less independently of the others. Huber and Schmidt in Germany, Munn in England, M. de Beauvoys in France

and Langstroth, in the United States, are all fairly though not equally entitled to credit and each has placed progressive bee-culture under tribute. Mr. Langstroth, however, seems entitled to much more credit than any of the others, for his hive had more practical value than the whole of the others together. In carrying out the common principle, Langstroth was undoubtedly far ahead.

The next stride in advance was the invention of the manufacture of "comb-foundation," which was a great desideratum, as the honey season in the temperate zone is comparatively short, and a new colony of bees supplied with the "comb foundation" will do as much in two or three days as one alongside of it without the foundation will do in eight or ten days, as the writer has repeatedly proved. Foundation-comb is made by pressing sheets of pure bees-wax between metal rollers or plates so constructed as to give to the wax the exact impressions of the cells in the basal wall of the natural comb. This saves the worker bees just that much labor and time, and they proceed at once to rapidly draw out and develop the incipient cells. The merit of this invention is also somewhat in dispute. Upward of twenty years ago the late eminent apiarist, S. Wagner, patented comb-foundation in the United States; but it soon transpired that Herr Mehring, in Germany, had previously made foundation, and that the Germans had been using it for three or four years. As it is the accumulated wit and experience of the age, rather than the man, that produces the invention, it is quite likely that Mr. Wagner arrived at the idea without the aid of the other German (for Mr. Wagner was himself a German). Montaigne said he "had as clear a right to think Plato's thoughts as Plato himself had"; and the American German had not only as good a right as the home Teuton to think out this invention, but he was just as likely to do so, and more likely, for the inspiring and inventive Yankee atmosphere would quicken his blood and sharpen his wits.

Recent bee-culture has been also greatly promoted and extended by the specialty of queen-rearing, which has been brought to great perfection on scientific principles. D. A. Jones, in Canada, and Henry Alley, in the United States, have developed the department of apiculture to an extent leaving, one would think, little to be further achieved or desired. As, however, under the progressive laws of evolution, we have ceased to set bounds to improvement in any thing not fixed mathematically, we will not say that any department of practical apiculture is yet fully wrought out to perfection.

In order to secure absolute purity of fertilization in the different varieties and sub-varieties in crossing, D. A. Jones, of Beeton, Ontario, has established queen-nurseries on