



A Clone of Your Own: The Science and Ethics of Cloning. Arlene Judith Klotzko. Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, United Kingdom. 2004. 162 pp. Price: £12.99.

The book under review focuses upon an important discovery in life sciences that happened towards mid-nineties of the last century. The impact of this discovery is so great that the present century might witness a revolution in human health and reproduction. On 5 July 1996, the birth of Dolly, a sheep, took place at Roslin Institute, Edinburgh, United Kingdom, by cloning the nucleus of a differentiated cell (mammary cell) from an adult sheep into an enucleated egg cell. The nucleus from the already differentiated cell can behave like the nucleus of a zygote giving rise to the adult mammal. This contradicted the long-standing belief among the scientific community that mammals cannot be cloned from the differentiated cell. Thereafter, scientists have been able to clone mice, cows, goats, pigs, rabbits, horses, rats, a cat and a mule. Humans are mammals. So the obvious question arises, whether cloning is possible in the case of humans? What are the benefits to mankind if human cloning becomes successful? If we think in a different line, cloning might be used for the selfish interest – to use human beings as animals. Therefore, the important question arises as to whether it is ethical to clone human beings? Are we becoming on a par with God by venturing into human cloning? In this book, the author gives a logical explanation to these perplexing queries by describing the immense potential which lies with the new technology for the development of mankind and also by stating examples of identical twins, which are already existing clones created by nature.

The book consists of six chapters, excluding introduction and conclusion. The

introduction gives an overview of all the following chapters. The first chapter 'Power without responsibility, creating life in the laboratory' describes fiction as well as movies, which show atrocities against humans while using them for experimentation. Interestingly, these stories, e.g. Aldous Huxley's fiction *Brave New World* published in 1932 and Ira Levine's *The Boys from Brazil* published in 1976, were made before Dolly was created. The cloning news renewed people's interest in them. The second chapter entitled 'Reversal of fortune: the science of cloning' gives an historical account of cloning from Weismann's theory in the nineteenth century to the success of Dolly. This chapter describes how Spemann got motivated by Weismann's concept and for the first time tried to do 'the fantastic experiment' of nuclear transfer from adult cells to younger cells during 1930s. It is interesting to note that the creation of Dolly took place at a time when the scientific community had almost decided that mammalian cloning is impossible by nuclear transfer from an adult differentiated cell. The third chapter 'Animal farm: cloning applications' describes the use of cloning in animal husbandry and in the development of transgenic pigs that are useful for organ transplantation to humans. The fourth chapter 'Building your own body repair kit: cloning for cell therapies' discusses the most important application of cloning to human health. Human cloning will be useful for therapeutic and reproductive purposes. Therapeutic human cloning is done to produce pluripotent stem cells which will be used to replace damaged body cells and thereby eventually will be able to cure some of the incurable diseases today. Cloning for human reproduction is described in the fifth chapter entitled 'A chip off the old block: cloning for human reproduction'. The usefulness of cloning will be immense to childless parents. The author has compared cloning as one step forward to *in vitro* fertilization (IVF), as she mentions 'IVF decoupled reproduction from the sexual act. Cloning goes one step further; using the technique for reproduction obviates the need for two parents, for the coming together of egg and sperm. There is shuffling of genes. Cloning for reproduction would thus be quite revolutionary; it would take us out of the paradigm of sexual reproduction into the paradigm of twins' (p. 110). Thus human cloning should be

welcome like IVF. The sixth chapter 'Double trouble: the fragility of identity' describes that cloning is already present in nature in the form of identical twins. Both have independent existence and have separate identities. Research studies on identical twins have revealed that 'personality traits such as extroversion, neurotism are about 50% heritable. Intelligence or IQ is between 60 and 70% heritable' (p. 136–137). In the concluding section the author reiterates her view in favour of reproductive cloning and makes her view obvious by stating, 'of course, we are profoundly affected by our genetic inheritance but, by and large, genes are about predisposition, not predestination. There is only one Mona Lisa. And there will never EVER be another you' (p. 151).

In chapter six and the conclusion, the author's description gives an impression that the time has come to venture into human cloning. Though cloning has been successful in ten different mammals, suggesting that it is possible in mammals, there are compelling evidences in the book which suggest that the time for human cloning is far-fetched. The simple argument that the experiment holds true cloning for one species and might not for another, is true here. Before venturing into cloning human beings, it has to be successful in monkeys and apes, the closest animals to humans in evolution. In fact, cloning has not been a cent per cent success story. In the case of Dolly, out of the three siblings, only Dolly survives and later developed arthritis (p. 39). The origin of the disease has not been understood. The epigenetic changes (imprinting) and telomere lengths, which are two major obstacles for mammalian cloning, have yet to generate satisfactory results in all the cloned mammals (p. 53). Hence cloning should be initially used to understand the complexity that lies in nature to form a complex organism from a simple cell. The author's argument in favour of reproductive cloning by citing examples of identical twins is impractical. It is true that identical twins lead independent lives and are not influenced to a great deal by each other, but the confusion created by their presence among others is well known. The presence of hundred such pairs will definitely create enormous confusion similar to the situation where people are present in a house whose sidewalls are made up of mirrors. Hence reproductive cloning should be

guided by the law 'if' it happens in future.

The book is an elegant work about the new era that might come with this important discovery. It provides ample arguments that justify human cloning and suggests that the hue and cry against cloning is unnecessary. The book is well written and is worth reading.

SUVENDRA KUMAR RAY

*Department of Molecular Biology and
Biotechnology,
Tezpur University,
Tezpur 784 028, India
e-mail: suven@tezu.ernet.in*



Value addition to Weather Data: Advisory Service to Farmers. V. Rajagopal and S. Naresh Kumar (eds). Central Plantation Crops Research Institute, Kasargod 671 124, India. 102 pp. Price: Rs 230.

Science is the foundation upon which the superstructure of modern agriculture is built. Genetics, plant physiology, pathology, entomology and other branches of science study nature and emerge with solutions to farmers' problems. Meteorology is yet another field of science with great potential to help farmers. Only a fraction of this potential is realized at present. All efforts to harness research in meteorology to improve the well-being of farmers are therefore most welcome. The present volume is an attempt in this direction.

To say that weather can make or mar a crop is to state the obvious. Total quantity and distribution of rainfall, humidity, temperature, wind and cloudiness are some aspects of weather that have profound impact on yields. Yet, a lot remains to be discovered. Unfortunately, weather study offers limited scope for experimentation in so far as vagaries in weather parameters are beyond our control. Hence, like in geology or astronomy, there is greater

emphasis on observation and recording data than there is on laboratory work.

One positive legacy of the British Raj in India is a hundred year-long database on weather. India Meteorology Department (IMD), New Delhi and Indian Institute of Tropical Meteorology (IITM), Pune constitute the backbone of data gathering and research in weather in India. Principally, this is regarded as the realm of physics. However, complexity of the phenomena is of such high order that it is often expedient to treat them as black boxes and attack them using statistical tools. The purpose of much of the research is twofold. One is to understand the manner in which the weather story unfolds and second is to predict its development. These exercises have to be dovetailed with agriculture to ensure benefits for farmers. State universities of agriculture generally have a separate department of agro-meteorology for such a purpose.

Conventionally meteorologists make a distinction between climate and weather. The former term is used to denote long-term trends, while latter is for short term. Hence climate has to be taken into account for strategic purposes. Coconut trees occur naturally in warm, humid and wet climate. Such aspects are relatively better known, perhaps because these are stable features. The present book aims at adding value, not to climate, but to weather data. I presume this means offering dynamic/tactical advice in response to latest weather reports. A book is therefore expected to provide rules used in such work and any experience in application of such rules.

Some uses of weather prediction are obvious. If you expect showers in the next couple of days, better not irrigate your potato field. Excess moisture may cause rotting. If there is a frost warning, you should keep your orchard warm by slow burning of farm residues or even spraying water on the apples. If overcast skies are predicted, it is better to quickly harvest your cauliflower. Cloudy weather makes the produce 'loose' and it fetches lower price. Such instantaneous use of weather forecast presumes a real-time interaction between the weatherman and farmers. Even when it exists, translating weather forecast into action requires understanding of crop-weather relationship that is far subtler than what is adequate in the above examples. Hence a major thrust needs to be developed in the crop-weather modelling front. We need to

build decision support systems that will allow the farmer to weigh the pros and cons and hedge the bets. It will be beneficial if we can predict onset/intensity of pest/disease attack. But can we go one step further and recommend optimal actions? For example, is it best to spray pesticide right away or should one wait for a shower that will wash away the pest? This is the challenge of adding value to weather data.

Another major potential use of a good crop-weather model is for crop insurance. All our efforts to protect the farmer against the risk of crop failure have been non-starters. It is simply too difficult to estimate 'losses' through traditional crop-cutting experiments. A new and pragmatic idea is weather insurance. Weather is monitored easily and accurately. One measurement applies to all farms in one locality. If actual yield can be estimated using these data, compensation, if any, can be paid promptly. This approach is being put into practice by the Agricultural Insurance Company of India and its website gives a good idea of the so-named Varsha Bima. This opens up a vast field in which crop yield forecast models based on weather data will have to be developed for every locality and every crop variety. My off-the-cuff estimate is that we need about 100,000 different crop-weather relationship models.

A lot of benefit can be derived at the strategic level even without elaborate models. I am reminded of an incident I heard from Sulochana Gadgil. It concerns a groundnut variety developed at Coimbatore and used by farmers in dry areas of eastern Karnataka. Many farmers complained about rains at the time of harvest. This can be a major difficulty in case of groundnut. It turned out that the time to maturity of the chosen variety was such that a chance of showers in this area at harvest was quite high. So, the variety was less suited to the area considering the rainfall pattern there. How often do we check this aspect?

All in all, a major breakthrough is possible if we put together farming expertise and weather research.

How well does the present book fulfil this promise? It offers advisory service to producers of coconut, arecanut and cocoa. It is an edited book. Fifteen authors, all scientists at the Central Plantation Crops Research Institute, Kerala have written ten chapters. There are laudatory messages by the Director General and Deputy Directory General of ICAR. The