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Ahead of Time Idea Regarding Haploid-Diploid or Haplodiploidy Reproduction to Solve the Problem of Human Infertility

***Abstract*: With the process of sexual reproduction the species are assuring the existence of its next generation on the earth with the sharing of genetic resources like DNA from both the parents. But disease likes infertility at the physiological, cellular and genetic level cause sexual incompatibility and hindering the reproducibility of the species. Present day human beings are mostly affected by the infertility and modern medical science is searching for cost effective near natural alternative methods to address the problem of male and female infertility. Alternative method of sexual-asexual Haploid Diploid reproduction is available in the insect orders like Hymenoptera and Thysanoptera, where haploid male offspring are developed from unfertilized eggs of the female and diploid female offspring are developed from the natural union of gametes like eggs and sperms. Here we are studying the future probability and applicability of Haplo-Diploidy method of reproduction in human beings through genetic level modification and further genetic evolution to solve the problem of human infertility.**

Keywords: Reproduction, Infertility, haplo-diploidy, genetic modification, genetic evolution

As per the proceedings of International Conference on Reproductive biology, Comparative endocrinology & Development organised by CSIR-CCMB, Hyderabad in between 14-16 September, 2022 infertility is a global health concern and approximately one out of seven couples are infertile worldwide[1]. Out of all the reported cases of male infertility, nearly 50% remain unexplained[1]. Poly Cystic Ovary Syndrome (PCOS) is one of the major health problems of women and the most common metabolic disorder leading to female infertility[1].As per the World Health Organization Infertility affects millions of people of reproductive age worldwide – and has an impact on their families and communities[2]. Estimates suggest that between 48 million couples and 186 million individuals live with infertility globally[2]. An incompatibility of male and female reproductive organs in the physiological, functional and genetic level is the basic cause of human infertility leads to various problems in human society.Not only that, as per the modern studies endocrine level dysfunctions are also one of the major causes of infertility, which are associated with unhygienic life styles and genetic level dysfunctions. In present days In Vitro Fertilization (IVF) is a very popular technique to address infertility, where union of male and female gametes are possible in a test tube outside the human body and then can implant the viable embryo within the uterus of the mother[3]. But this artificial technique is age dependent, time consuming, costly and unaffordable, inaccessible to the lower middle income groups and having social stigma among few underdeveloped communities. So there is a need of natural, safest, normal reproductive cell level corrective measures, more specifically genetic level modifications or progression to address the health and related socio-economic problem of infertility in the world. Now the question is if such kind of Reproductive Procedure or Phenomenon is available in animal kingdom? The answer is yes and hidden in the reproductive mechanism of ants, bees, wasps and thrips i.e. among the insect order of Hymenoptera and Thysanoptera respectively. In between 1939-1942 famous self-made Kolkata based scientist of natural history and famous science communicator Sir Gopal Chandra Bhattacharya had experimented and observed that common red ants are producing female offspring from their fertilized eggs, but at the same time male offspring are producing from the unfertilized eggs of the female ants irrespective of either queen or worker female ants[4]. Not only was that it sounded like science fiction when it had reported first time that one honey bee was unable to move and mate with his male counterpart due to having injury in her wing, but was able to produce only male offspring from her unfertilized eggs[5-7]. But now it is not a science fiction and we know the answer that, bees, ants, wasps and mites are able to produce male offspring without fertilized eggs by the method of "Haplo-Diploidy Reproduction" [5-7]. But the question is how they evolve with the unique reproductive method of "Haplo-Diploidy"? With the age of evolution insectslike red ants, mites and bees have adapted with the

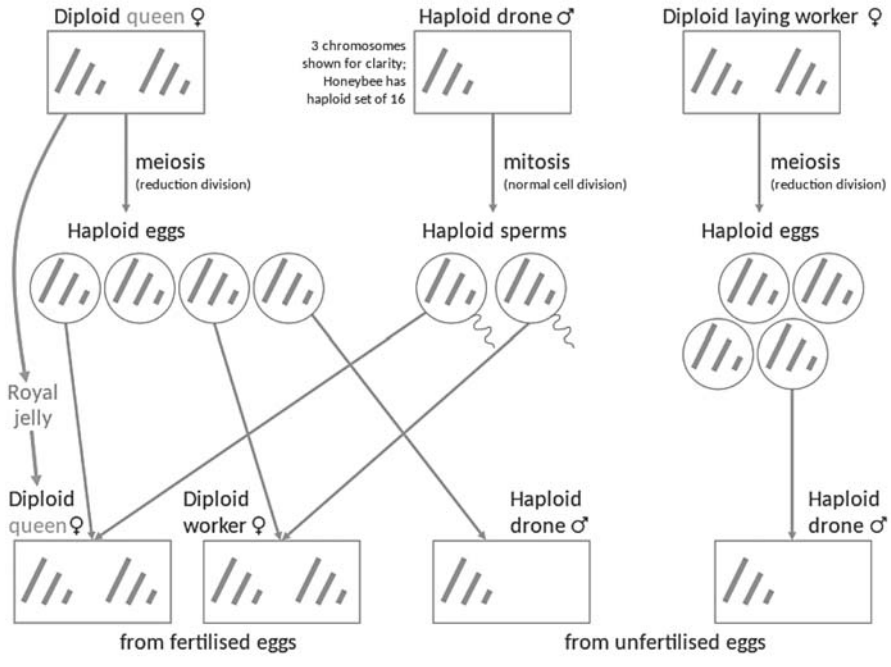

Fig. 1. Haplo-diploidy Reproduction (Source: Wikipedia)

technique of haplo-diploidy with the scientific principle of maternal-paternal gene conflict with result of Paternal Gene Elimination (PGE) from the germ line to produce haploid male from the unfertilized eggs[8]. Apart from that in honey bees it was reported, actually to produce Diploid mutant male complimentary sex determiner gene (*csd*) has thrown out from the fertilized embryo also[9]. We know that human baby is getting equal portion of chromosome or genetic material from both the parents and we human being are Diploidy irrespective of sex. But Diploid mutant haploid male human baby can take birth by the modern techniques of gene editing from the fertilized human eggs by the CRISP-CAS9 (scissor) gene editing tool[10]. If in future Diploid mutant haploid male parent are available through genetic engineering in the human society, then with the natural genetic level need, changes and evolution Diploid mutant haploid male human baby can take birth from the unfertilized eggs of the human society to create societal balance and gender equality among us. It will not hamper the normal sex determination and reproduction of the female baby from the fertilized eggs of the mothers. Now a day's due to several socio-economic reasons people wants to become single parent. But in that case their options of becoming parent are limited to adoption of child from the orphanage or from hiring of either sperm or eggs/womb of other person. Lots of legalities, rules and regulations are involved here to become a parent. In case of adoption there involved apprehension that in future original parents may come with the claim of their children based on the principle of natural justice. The application and experimentation of modern scientific knowledge by the tools of Genetic Engineering and Modification (GEM) in germ cell line correction[11] to address the health and societal issue of infertility among human community should not be barred from the national and international Government of the world. Actually they should facilitate the Reproduction and development of Human Resource with the method of Haplo-diploidy in future. But question is how much is it feasible to apply reproductive techniques of insects into humans?

Answer is hidden in the recent examples of development in modern science based on insect and other animal models and their successful application in human beings. Most of the human health and physiology related issues have addressed successfully by using the fruit fly model of *Drosophila melanogaster*. As per the report of "Nature" journal scientist are working on the transplantation of organs of the pigs into human body and they are getting success also[12]. Not only that, in recent past "Nature" journal reported that Organoid of human brain has been transplanted into Rat to study the mechanism and physiology of "Schizophrenia" and other human brain related diseases[13]. Transplanted neurons of human brain in the Rat are also developing and giving response through electrical pulses[13]. Somatic and reproductive Cells of the human and animals are dividing in the same principle of Mitosis and Meiosis. In case of ants, bees, wasps and mites haploid eggs are developed through Meiosis and haploid sperms are developed through Mitosis prior fertilization[5-7] (Fig. 1). In these insects haploid sperm developed through mitosis to maintain same haploid chromosome number in male and at the time of fertilization to maintain same Diploid chromosome number in female offspring (Fig. 1). So, objective of cell division is same in the both the species of insects and humans to maintain the same chromosome number in their offspring after the reproduction (Fig 1). Insects and humans are two interdependent species in this Bio-diverse world, nothing beyond that.

Conclusion: So, in conclusion it has to be said that in near future, Haploid-Diploid or Haplodiploidy mechanism of Reproduction may be a definite answer to eradicate the

disease and socio-economic-health problem of infertility from the human society. ❐

SANJIT KUMAR SAHA

Deputy Conservator of Forests,
Personnel, Aranya Bhawan,
Kolkata-700106, Directorate of Forests,
Government of West Bengal

Corresponding to e-mail: sanjitwbfs@gmail.com

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