The human genome project

The Human Genome Project is a worldwide research effort with the goal of analyzing the structure of human DNA and determining the location of the estimated 100, 000 human genes. The DNA of a set of model organisms will be studied to provide the information necessary for understanding the functioning of the human genome. The information gathered by the human genome project is expected to be the source book for biomedical science in the twenty-first century and will be of great value to the field of medicine. The project will help us to understand and eventually treat more than 4, 000 genetic diseases that affect mankind. The scientific products of the human genome project will include a resource of genomic maps and DNA sequence information that will provide detailed information about the structure, organization, and characteristics of human DNA, information that constitutes the basic set of inherited “ instructions” for the development and functioning of a human being.

The Human Genome Project began in the mid 1980’s and was widely examined within the scientific community and public press through the last half of that decade. In the United States, the Department of Energy (DOE) initially, and the National Institutes of Health (NIH) soon after, were the main research agencies within the US government responsible for developing and planning the project. By 1988, the two agencies were working together, an association that was formalized by the signing of a Memorandum of Understanding to “ coordinate research and technical activities related to the human genome”. The National Center for Human Genome Research (NCHGR) was established in 1989 to head the human genome project for the NIH. NCHGR is one of twenty-four institutes, centers, or divisions that make up

the NIH, the federal government’s main agency for the support of biomedical research. At least sixteen countries have established Human Genome Projects.

The Office of Technology Assessment (OTA) and the National Research Council (NRC) prepared a report describing the plans for the US human genome project and is updated as further advances in the underlying technology occur.

To achieve the scientific goals, which together encompass the human genome project, a number of administrative measures have been put in place. In addition, a newsletter, an electronic bulletin board, a comprehensive administrative data base, and other communications tools are being set up to facilitate communication and tracking of progress. The overall budget needs for the effort are expected to be about $200 million per year for approximately 15 years.

Lasers are used in the detection of DNA in many aspects of the project; a very important use is in sorting chromosomes by flow cytometry. Lasers are also used in confocal fluorescence laser microscopy to excite fluorescently tagged molecules in genome mapping, in addition to other mapping uses. In diagnostic applications, lasers are used with fluorescent probes attached to DNA to light up chromosomes and to create patterns on DNA chips.

From the beginning of the human genome project it was clearly recognized that acquisition and use of such genetic knowledge would have momentous involvements for both individuals and society and would pose a number of consequential choices for public and professional deliberation.

As Thomas Lee writes, “ the effort underway is unlike anything ever before attempted, if successful, it could lead to our ultimate control of human disease, aging, and death”.

Whatever its justification, the human genome project has already inspired society with the hope of “ better” babies, and one way to deploy pragmatism in the analysis of genetic engineering is to look at this promise of “ better” babies in its social context: parenthood. Parents hope for healthy children and, if they could afford it, make choices (such as choosing parental care) to help “ engineer” healthier babies. Genetic engineering seems in this respect to offer the brightest hope for parents. Through germ-line therapy, disastrous, but genetically discrete diseases, such as Huntington’s and cystic fibrosis could be removed from the DNA of the egg or zygote. Clearly parents would follow the model in choosing to avoid a short, painful life for their children.

Another more reasonable fear is that we have not the slightest idea what we are doing and ought to avoid making hasty choices. Hybrid varieties are often impossible to protect from the complexities and dangers of nature. In the human condition, this is the possibility of making an error and creating a genetically advanced baby who cannot cope with an imperfect world. While much of society reports a willingness to modify DNA for the purpose of heightening intelligence, education about genetics and medicine is still in its beginning.

Jonathan Glover argues for a “ pragmatism of risks and benefits”, writing that, “ The debate on human genetic engineering should become like the on

nuclear power: one in which large possible benefits have to be weighed against big problems and great disasters”.

One significant element is the assertion that genetic engineering is radically different from any other kind of human medicine, and constitutes interference in a restricted area, trying to “ play God”.

As Robert Wright notes, “ Biologists and ethicists have by now expended thousands of words warning about slippery slopes, reflecting on Nazi Germany, and warning that a government quest for a super race could begin anew” if genetic engineering ventures “ too far”.

In my opinion, I believe that, if and only if, a deadly disease is detected, then the scientists and/or doctors should tap into the DNA of a zygote or egg for testing and absolute knowledge of the steps of the procedure must be present. I do not believe that there should be a genetically advanced child in the world, everyone is created equal and nobody should have their destiny changed for any reason.