What Is New in Genetics?

A new technology emerged in the 1980s.
- They found regular DNA sequences that were repeated in the genome. They were named CRISPR, Clustered Regularly Interspersed Short Palindromic Repeats
- CRISPRs activate a set of proteins. CRISPR Associated proteins or CAS Proteins which can attack the DNA.
- After 30 years it is now possible to alter DNA and to modify human cells.
- "Gene Editing" was born.

Separate research has found that certain genes can lead to diseases.

The best known and studied are:
- Down's Syndrome
- Sickle Cell Disease
- Tay Sachs Disease
- Cystic Fibrosis

It would be a good thing to be able to diagnose these in potential parents - most would agree. It may be a good thing if the diagnosis can be made early in the fetus and abortion used as an option.

Another new technology is "Gene Drives", which is problematic.

Ethics and Legal Issues

Will address not just CRISPR, but other related.

1. Genetic testing of fetus
2. Genetic testing for risk of disease
3. Removing defective genes - editing - from fetus
4. Gene Drives
5. Making a superior race - and general ethical issues
6. Patents

1. Genetic Testing for Fetal Defects
   Can do the test on mother's blood avoids amniocentesis and villous biopsy.
2. Genetic Testing for Risk of Disease
   - Vast majority of diseases are not written in our genes
   - Testing is now available BUT commercially - 23andMe
   - One example:
     - Author sent his blood to several laboratories.
       - Higher than average risk for prostate cancer, Parkinson's, melanoma and other diseases
       - Others said his risk was normal
       - One said he had "a 32 percent increased chance" of developing Parkinson's disease. Real numbers: 2:1 for author, 1:6 for rest of us
   - Problems
     - Unreliable
     - Exaggerated risk calculation
     - Anxiety
     - Nothing you can do
     - Insurance - "pre-existing condition"

3. Gene Editing
   - NPR reported on 8/2/17 that it has been done
   - Ethics and implications

4. Gene Drives
   - Modifies the sex cells and can spread rapidly through the species in a few generations
   - Being considered for mosquitoes for malaria control
   - Serious unintended consequences

5. Making a superior race
   - Not feasible because it's not a single gene function but multiple systems are involved

6. Patent issues
   - University of California and Broad Institute at MIT already have teams of lawyers
   - Issue of Public Funded research for private gain - the rules allow it