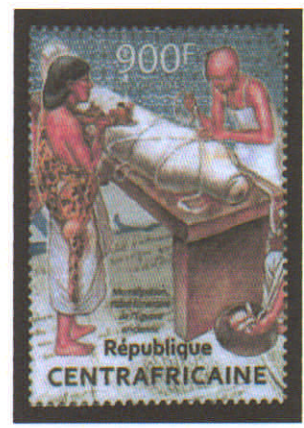
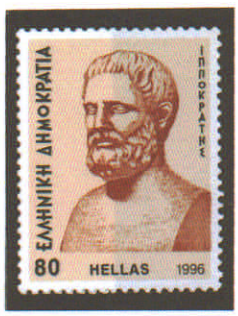
ANCIENT OBSERVATIONS

EARLY EGYPTIAN,GREEK AND ARAB PHYSICIANS RELIED ON CONTINUAL OBSERVATION AND NOTATION OF THEIR PATIENTS SYMPTOMS TO AID DIAGNOSIS

THE EGYPTIANS NOTED THEIR FINDINGS IN THE **MEDICAL PAPYRUS SCROLLS** WRITTEN c.2200-1500 BCE



MODERN FORENSIC EXAMINATION INCLUDING DNA SEQUENCING HAS SHOWN EVIDENCE OF GENETIC ABNORMALITIES IN EGYPTIAN MUMMIES DATING FROM c. 3200 BCE



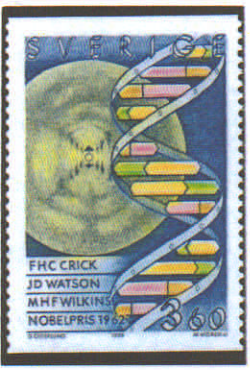
HIPPOCRATES OF KOS (460 - 370 BCE) THE GREEK PHYSICIAN OBSERVED CHANGES IN SKIN PIGMENTATION WITH PURPLE COLOURATION (PORPHYRIA - GREEK FOR PURPLE)

VISUAL EXAMINATION OF URINE NOTING VOLUME, DEPOSITS, CLARITY AND COLOUR WERE A DIAGNOSTIC TOOL FROM 500 AD.UNTIL THE 1600s. **PROTOSPATHRIUS**, A GREEK PHYSICIAN, SET OUT A RANGE OF COLOURS AND THEIR DIAGNOSTIC SIGNIFICANCE IN '*DE URINUS*'

THE ANCIENT RELIGIOUS CULTURE OF CIRCUMCISION DATES BACK 4000 YEARS. A RULING IN THE TALMUD OF **RABBI JUDEUS** 200AD. BANNED CIRCUMCISION IF A PREVIOUS SON HAD DIED AS A RESULT OF BLEEDING

THE CIRCUMCISER

DEOXYRIBONUCLEIC ACID - DNA



IN 1962 **ROSALIND FRANKLIN (1920-1958)** WORKING WITH **MAURICE WILKINS (1916-2004)** USED X-RAY CRYSTALLOGRAPHY TO STUDY DNA. FRANKLIN PRODUCED TWO SETS OF HIGH RESOLUTION IMAGES OF CRYSTALLIZED DNA FIBRES.

FRANCIS CRICK (1916-2004) BRITISH MOLECULAR BIOLOGIST AND **JAMES WATSON (1928-)** AMERICAN MOLECULAR BIOLOGIST. WORKED TOGETHER ON NUCLEIC ACIDS. BASED ON FRANKLIN AND WILKINS X-RAY CRYSTALLOGRAPHY IMAGES, CRICK AND WATSON CONSTRUCTED A 3 DIMENSIONAL MODEL OF THE MOLECULAR STRUCTURE OF DNA - THE DOUBLE HELIX. IN 1953 THEY PUBLISHED THEIR FINDINGS.

CRICK, WATSON AND WILKINS WERE AWARDED THE 1962 NOBEL PRIZE FOR PHYSIOLOGY AND MEDICINE.

FREDERICK SANGER (1918-2013)
BRITISH BIOCHEMIST.
IN 1977 HE DEVELOPED 'THE RAPID DNA SEQUENCING TECHNIQUE'. THIS METHOD WAS EVENTUALLY USED TO SEQUENCE THE ENTIRE HUMAN GENOME. HE WAS AWARDED THE 1980 NOBEL PRIZE FOR CHEMISTRY.

MARSHALL.W.NIRENBERG (1927-2010)
AMERICAN BIOCHEMIST AND
HAR.G.KHARANA (1922-2011)
PUNJABI/AMERICAN BIOCHEMIST.
BETWEEN 1961 AND 1967 THEY DECIPHERED THE CODONS IN THE DNA NUCLEIC ACID CHAINS LEADING TO THE ELUCIDATION OF THE GENETIC CODE.

THEY SHARED THE 1968 NOBEL PRIZE FOR CHEMISTRY WITH ROBERT HOLLEY.

FOUNDERS OF GENETICS

GREGOR MENDEL (1882 - 1884) AN AUGUSTINIAN FRIAR. 'FATHER OF GENETICS' HE IDENTIFIED MANY OF THE RULES OF INHERITANCE WHILST WORKING WITH PEA PLANTS. BETWEEN 1856 AND 1863 HE NOTED SPECIFIC TRAITS WERE PASSED TO THE NEXT GENERATION AND REMAINED UNCHANGED IN SUCCESSIVE GENERATIONS. THESE TRAITS WERE LATER IDENTIFIED AS GENES

THOMAS H MORGAN (1866 - 1945) AMERICAN ZOOLOGIST/ GENETICIST. IN 1908, WORKING WITH FRUIT FLIES (*DROSOPHILA MELANOGASTA)* TRIED TO FIND AN INHERITABLE MUTATION, FINALLY SUCCEEDING IN 1909.

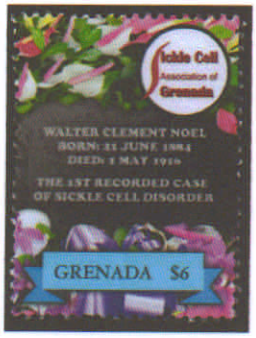
IN 1910 HE PUBLISHED HIS FINDINGS CONCLUDING THAT SOME TRAITS WERE CARRIED ON THE SEX-LINKED CHROMOSOMES AND SOME BY OTHER CHROMOSOMES. HE WAS AWARDED THE 1933 NOBEL PRIZE FOR PHYSIOLOGY AND MEDICINE.

GEORGE W BEADLE (1903-1989) AMERICAN GENETICIST. IN 1939, WORKING WITH **EDWARD TATUM (1909-1975)** USING THE MOULD *NEUROSPORA CRASSA* THEY PROVED THAT SPECIFIC GENES CONTROL THE SYNTHESIS OF INDIVIDUAL CELLULAR SUBSTANCES. BY 1944 BEADLE AND TATUM HAD FORMULATED THE *'ONE GENE-ONE ENZYME'* CONCEPT. THUS A SINGLE GENE CODES FOR THE SYNTHESIS OF ONE PROTEIN.
AWARDED THE 1958 NOBEL PRIZE FOR PHYSIOLOGY AND MEDICINE.

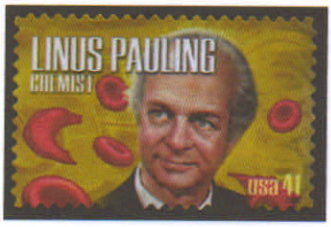
BARBARA McCLINTOCK (1902-1992) AMERICAN GENETICIST WHO PLANTED AND CROSS-FERTILIZED MAIZE THEN CONDUCTED MICROSCOPIC STUDIES OF INDIVIDUAL MAIZE CHROMOSOMES. SHE DISCOVERED MOBILE GENES-*'JUMPING GENES'* AND PROVED THAT CHROMOSOMES EXCHANGE GENETIC INFORMATION DURING CELL DIVISION.
AWARDED 1983 NOBEL PRIZE FOR PHSIOLOGY AND MEDICINE

HAEMOGLOBINOPATHIES

SICKLE CELL ANAEMIA



ERNEST.E.IRONS (1877-1959) AND **JAMES.B.HERRICK (1861-1954)** FIRST DESCRIBED A RED CELL ABNORMALITY IN 1910. IRONS SAW 'PECULIAR ELONGATED AND SICKLE SHAPED CELLS' IN THE BLOOD OF **WALTER CLEMENT NOEL (1884-1916)** A 20 YEAR OLD DENTAL STUDENT FROM GRENADA. NOEL HAD BEEN ADMITTED TO HOSPITAL IN CHICAGO SUFFERING FROM ANAEMIA

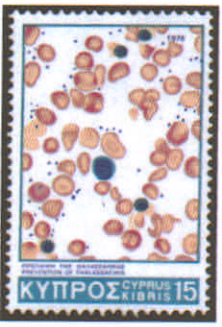


LINUS PAULING (1901-1994) AMERICAN SCIENTIST STUDIED THE MOLECUAR STRUCTURE OF HAEMOGLOBIN USING THE TECHNIQUE OF MOVING BOUNDARY ELECTROPHORESIS DEVELOPED BY **ARNE TISELIUS (1902-1971)**

IN 1949 HE REPORTED THE PRESENCE OF THE ABNORMAL HAEMOGLOBIN IN SICKLE CELL ANAEMIA - **HbS.**

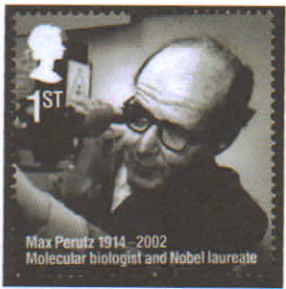
SICKLE CELL ANAEMIA IS PREVALENT IN PEOPLE FROM THE CARIBBEAN AND SUB-SAHARAN AFRICA REGIONS

THALASSAEMIA

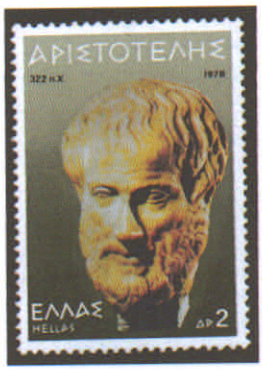


THOMAS.B.COOLEY (1871-1945) AMERICAN PAEDIATRICIAN AND HAEMATOLOGIST. WORKING AT MICHIGAN CHILDREN'S HOSPITAL, HE INVESTIGATED ANAEMIA IN CHILDREN OF GREEK/ITALIAN ORIGIN. THE CHILDREN PRESENTED WITH HEPATOSPLENOMEGALY, BONE DEFORMITIES AND SEVERE GROWTH RETARDATION. IN 1925 HE REPORTED THE CASES AS 'ERYTHROBLASTIC ANAEMIA' ALSO KNOWN AS 'COOLEY'S ANAEMIA'.

MAX PERUTZ (1914-2002), AUSTRIAN BORN, BRITISH MOLECULAR BIOLOGIST.
BETWEEN 1953 - 1959 USING X-RAY DEFRACTION ANALYSIS HE DETERMINED THE STRUCTURE OF OXY-HAEMOGLOBIN AND DEOXY-HAEMOGLOBIN.
AWARDED THE 1962 NOBEL PRIZE FOR CHEMISTRY



HAEMORRHAGIC DISORDERS



ARISTOTLE (384-322 BCE)
GREEK PHILOSOPHER/SCIENTIST AND
ALBUCASIS aka AL-ZAHRAWI (936-1013)
ARAB PHYSICIAN, RECOGNISED THE HEREDITARY NATURE OF SOME FORMS OF BLEEDING. AL-ZAHRAWI WAS THE FIRST PERSON TO DESCRIBE THIS IN HIS MANUSCRIPT *'AL-TASRIF'*

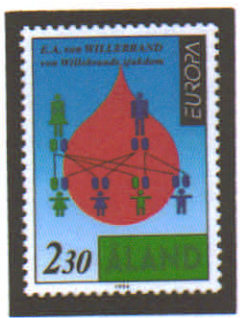
HAEMOPHILIA

QUEEN VICTORIA (1819-1901) WAS A HAEMOPHILIA CARRIER (X-LINKED) AND PASSED THE DISEASE TO HER SON LEOPOLD (1853-1884) AND TWO OF HER DAUGHTERS, **PRINCESS ALICE (1843-1878)** AND PRINCESS BEATRICE (1857-1944) .
ALICE MARRIED LOUIS IV OF HESSE AND PASSED THE HAEMOPHILIA GENE TO HER TWO DAUGHTERS, PRINCESS IRENE (1866-1953) AND **PRINCESS ALIX (1872-1918)**

PRINCESS ALIX (EMPRESS ALEXANDRA OF RUSSIA) MARRIED TSAR NICHOLAS II (1868-1918). THEIR SON TSAREVITCH ALEXEI (1904-1918) INHERITED HAEMOPHILIA FROM HIS MOTHER. THE FAMILY WAS MURDERED IN THE RUSSIAN REVOLUTION OF 1918.

IN 2009 DNA TESTING OF THEIR REMAINS REVEALED THAT SOME MEMBERS SUFFERED FROM HAEMOPHILIA 'B' - FACTOR IX DEFICIENCY KNOWN AS CHRISTMAS DISEASE, NAMED AFTER STEPHEN CHRISTMAS (1947-1993) THE FIRST CLINICALLY DIAGNOSED CASE

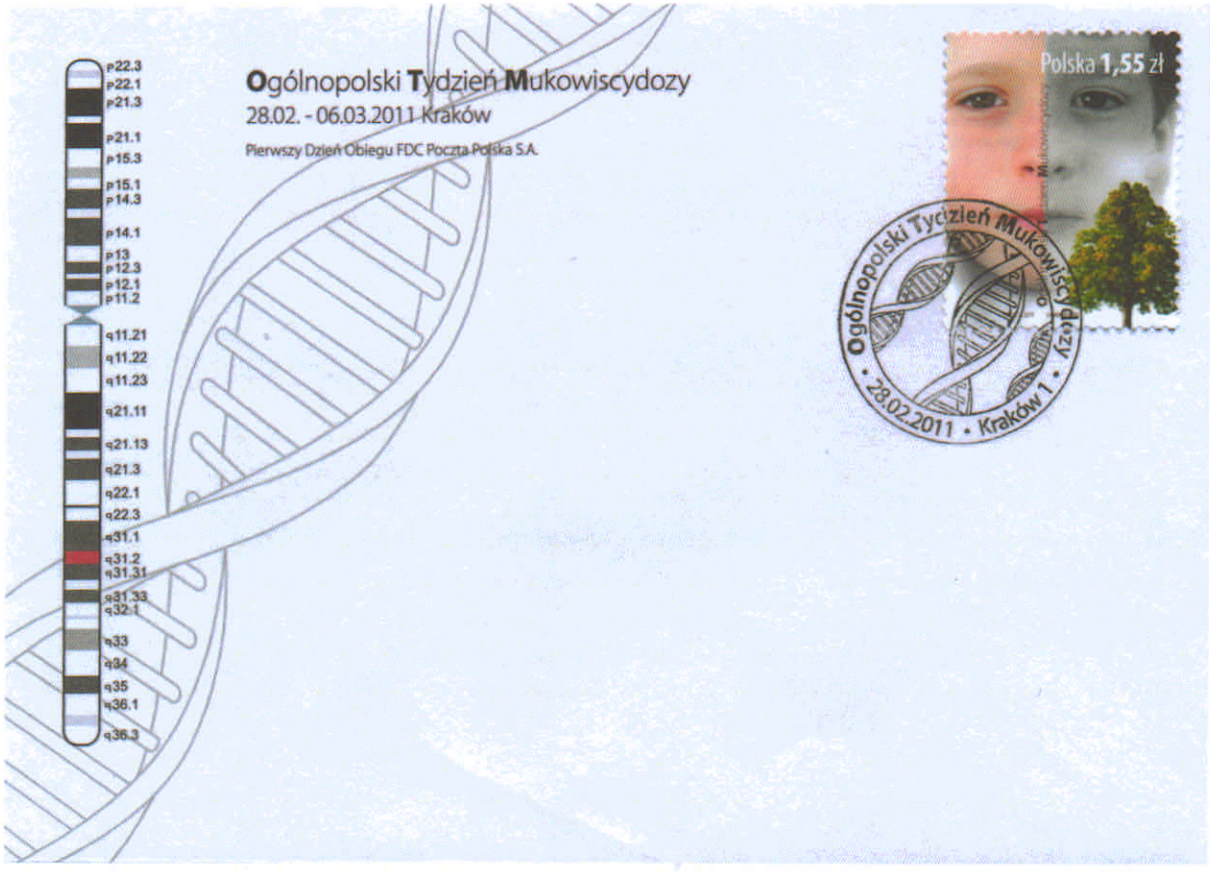
VON WILLEBRAND DISEASE



ERIK VON WILLEBRAND (1870-1949) FINNISH PHYSICIAN. IN 1925 ON THE ALAND ISLANDS HE EXAMINED A FIVE YEAR OLD GIRL WITH A BLEEDING DISORDER. INVESTIGATIONS INTO THE FAMILY REVEALED 23 OF 66 MEMBERS HAD A BLEEDING DISORDER. HE CONCLUDED THAT THIS WAS A NEW TYPE OF HAEMOPHILIA. IN 1926 HE DESCRIBED IT AS A THROMBOCYTIC DYSFUNCTION, NOW RECOGNISED AS AN AUTOSOMAL GLYCOPROTEIN DEFICIENCY.

MODERN MARKERS FOR OLD CONDITIONS

CYSTIC FIBROSIS



IN 1938 **DR DOROTHY ANDERSON (1901-1963)** AN AMERICAN PATHOLOGIST WROTE THE FIRST DESCRIPTION OF CYSTIC FIBROSIS IN 1985 **PROFESSOR LAP-CHI TSUI, DR FRANCIS COLLINS** AND **PROFESSOR JACK RIORDAN** IDENTIFIED THE CAUSATIVE GENE ON CHROMOSOME 7. IN 1989 THEY NAMED THE DEFECTIVE GENE AS CYSTIC FIBROSIS TRANSMEMBRANE CONDUCTANCE REGULATOR (CFTCR)

DOWN SYNDROME

JOHN LANGDON DOWN (1828-1896) DESCRIBED THE SYNDROME IN 1866 IN 1959 TWO FRENCH GENETICISTS **MARTHA GAUTIER** AND **JEROME LEJEUNE** SEPARATELY CLAIMED THE DISCOVERY OF A CHROMOSOMAL ABNORMALITY ON THE 21st PAIR. IN 1960 THIS WAS NAMED AS TRISOMY 21.