# Genetics

The characteristics of **Traveller** characters have both a generated component and an inherited component. The inherited (or genetic) component can be passed from generation to generation by characters.

The inherited components (the genes) of characteristics enables a player to create characters in other historical milieux with demonstrable links to the player's primary character. They also allow characters to create children through which they can continue role-playing after the demise of the original character. Genetics also allows the creation of clones.

**IMPORTANT TERMS**

The following terms are important for the understanding of genetics.

**Gene.** The individual inherited value for a genetic characteristic. Human Strength is generated with 2D: the first die (1-6) is the inherited part of Strength and that value is the Gene. The second die (1-6) is the developed Strength based on experience and environment.

A normal Gene has a value from 1-6. Higher and lower values can occur though mutation or geneering.

A Gene with a value of 0 is *defective*.

**Genetic Characteristic.** A characteristic which has some basis in genetics. Strength is a genetic characteristic because part of it is determined by genetics; Education is NOT a genetic characteristic because genetics does not determine Education.

**Genetic Profile.** The initial letters of the characteristics for a species. For humans (with Str Dex End Int Edu Soc) this is SDEIES. One Genetic profile is identical to another Genetic Profile if both have identical Genetic elements; it disregards non-genetic elements.

For example, SDEIES and SDEITC are identical. SAVIIC and SAVIIS are identical. SGSITS and SGSIIS are not identical.

**DNA.** A variation of the UPP which shows the values for Genes. / Inherited D. Non-genetic characteristic positions are shown as X.

For identification, the DNA string is preceded by the letters DNA.

Since some sophont genetics are based on variants of DNA, the string may instead be preceded by 1NA, 2NA, 3NA, 4NA, 5NA or 6NA (the number indicating the number of participating genders for the species), or MNA (= 1NA), DNA (=2NA), or TNA (=3NA). For convenience, the term DNA also means all of the alternative terms.

For example, the digit in the C1 position of DNA is the Strength Gene.

**Inherited D.** The portion of a characteristic which is determined by genetics. Also called a Gene.

**Generated D.** The portion of a characteristic which is not a Gene or Inherited D.

**GENETIC TERMS**

| | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| Genetic Profile= | S | D | E | I | E | S |
| DNA- | 3 | 2 | 4 | 6 | X | X |
| Die Rolls= | 4 | 6 | 5 | 4 | 5+6 | 6+6 |
| UPP= | 7 | 8 | 9 | A | B | C |

This table shows Humans.

**THE BASIC PRINCIPLES OF GENETICS**

Characteristics are generated with one or more dice. For humans, Strength is generated with 2D. For some non-humans, Strength may be generated with 1D, 2D, 3D, or even 4D.

The first D rolled for a genetic characteristic is the **Gene** for that characteristic. The remaining D for the characteristic represent training, experience, and environment.

For example, human Strength characteristic is generated using 2D. 1D is the genetic component inherited from generation to generation. The other 1D is the generated component and rolled on 1D when the character is created.

For example, human Eneri Dinsha inherits a Strength gene =4 from his father. When Eneri is generated, the player rolls 1D =3 for Strength =7.

**Creating Characters Without Using Genetics**. When creating characters (for example for the first time) without genetics, all the required dice are rolled normally. The Genes can be determined later or as necessary through Genetic Testing.

**Genes.** Genes can be inherited from parents and passed on the offspring. Genes are used when creating clones.

**Mutation and Genetic Engineering.** Each Gene is originally generated with 1D. It may increase or decrease as a result of mutation or genetic engineering. A Gene with a value of 0 is *defective*.

**The Genetic Characteristics.** A Genetic Characteristic is genetically inheritable.

The Physical Characteristics C1 C2 and C3, Intelligence C4 and Instinct C5 are genetic characteristics. Caste C6 may (or may not) be genetic.

Education C5, Training C5, Social Standing C6, and Charisma C6 are not genetic.

**GENETIC CHARACTERISTICS**

| | Genetic | | | Non-Genetic | |
|---|---|---|---|---|---|
| C1 | Strength | | | | |
| C2 | Dexterity | Agility | Grace | | |
| C3 | Endurance | Stamina | Vigor | | |
| C4 | Intelligence | | | | |
| C5 | Instinct | | | Education | Training |
| C6 | Caste* | | | Social | Charisma |

* Caste may be Genetic or Non-Genetic.

If the character has Caste and it is marked Genetic for that species (in a detailed description of that sophont), it is Genetic; otherwise, it is not.

**DNA (or MNA, and others)**

Genes for a character are recorded as DNA (a six-digit UPP string preceded by DNA- (non-genetic components are shown as X). For example, human Eneri Dinsha has DNA 4456XX.

**Alien DNA.** The name DNA (Di- ribo Nucleaic Acid) refers to the double helix self-replicating molecule. DNA is a double because it has components supplied by two genders.

If genetic components are supplied by more than (or less that) two genders, then the proper name for DNA changes. For ease of reference, DNA in a general sense includes all the other possible NA structures.

The six-gendered Plexxan would show its Gene sequence as 6NA-5346X9 (note the 9 in position C6 indicates the Plexxan have a genetic Caste structure).

**HUMAN AND ALIEN DNA**

| Gender Structure | Genetic Component |
|---|---|
| Solitaire | MNA or 1NA |
| Dual | DNA or 2NA |
| FMN* | DNA or 2NA |
| EAB | TNA or 3NA |
| Group** | 1NA 2NA 3NA 4NA 5NA or 6NA |

* because the Neuter does not participate.

** depending on the number of participating Genders.

**1D Characteristics.** If Sophont Generation dictates that a characteristic is rolled with 1D, then all of that value is the Gene, and there is no Generated D.

**Gene Contributions By Non-Humans.** If the parents are non-human sophonts, then variations are possible based on Gender.

For any gender with two or more components, the appropriate Gene is selected from the available values of all possible parents. However, Neuter Gender is always ignored and cannot contribute a Gene. Bearer Gender can contribute a Gene (during the bearing process). Gender One in the Solitaire Gender Structure always contributes all of the Inherited D.

**DETERMINING THE VALUES FOR GENES**

The values for Genes can be determined during characteristic generation, or later through Genetic Testing.

**During Character Creation.** Ideally, when a new character is created, the first D rolled is the Gene and should be recorded on the character's Genetics Card.

For example, when the human character Gustav Winkhoek is generated, the player rolls 2D for Str producing 3 and 4. The first D rolled (3) becomes the Strength Gene. When sophont Plexxan is generated (with 3D for Str), the player rolls 5, 4, and 3. The first D rolled (5) is the Strength Gene.

**Genetic Testing.** If Genes were not noted during characteristic generation, they may be determined through testing.

Genetics Testing is a formal situation under the guidance of a referee, the player rolls 1D for each Genetic characteristic and enters the values on the Genetics Card. The referee takes care to avoid contradictions (such as: the Gene becoming greater than the present characteristic).

**Obvious Genetic Values**

Some genetic values can be deduced. Some examples are shown below, and other values can be logically deduced as well.

**Characteristic Created With 1D.** If a characteristic is created with 1D, then its entire value is a Gene.

**2D Value = 2.** The Gene = 1.

**2D Value = 12.** The Gene = 6.

**3D Value = 3.** The Gene = 1.

**3D Value = 18.** The Gene = 6.

**CREATING HUMAN OFFSPRING**

When two Human characters mate and generate a child, that child character randomly acquires the Gene of a characteristic from one of his parents.

For example, two human parents marry and have a single child. For each of Strength, Dexterity, Endurance, and Intelligence, a random roll determines if the Gene comes from the father or the mother. In this example, assume the roll result alternates father and mother as the donor.

| Mother (Parent1) | Father (Parent2) |
|---|---|
| Aia Restef | Gustav Windhoek |
| DNA-3456XX | DNA-6543XX |

Child
Stephan Windhoek
DNA-6446XX

On this genetic base, the player for Stephan Windhoek rolls for the complete UPP. Since humans roll 2D for characteristics, Genes are determined by genetics; the Generated D is rolled with 1D by the player to create the final UPP.

**Creating Parents.** It is also possible to create parents for an existing character. Given an existing DNA-, random rolls are used to determine which Genes were received from which parent. Those which were not genetically determined are created by random die rolls.

**Recording Genes.** The parentage of DNA can be marked with subscripts. For example, Stephan Windhoek's DNA can be written DNA-$6_2 4_1 4_2 6_1$XX (his mother is Parent1 and provides subscript-1; his father is Parent2).

**CREATING SOPHONT OFFSPRING**

When the appropriate number of sophont characters mate and generate a child, that child character randomly acquires the Gene of a characteristic from one of his parents.

**Excluded Parents.** A Neuter does not participate in the reproductive process and he is excluded from gene contribution.

**Contributing Genes**

Each eligible parent has the opportunity to contribute each Gene. Assign to each parent a number from 1 to 6 corresponding to the individual's gender. Roll 1D to determine the contributing parent; if the die roll does not correspond to a parent, reroll.

**Some Genes are Gender-Linked.** They are automatically transmitted to Same-Gender children; they are never transmitted to Different-Gender children.

**Some Genes are Caste-Linked.** They are automatically transmitted to Same-Caste children; they are never transmitted to Different-Caste children.

**HOW MANY OFFSPRING?**

The number of children produced by a sophont family can vary widely, and depends greatly on the number of genders the stability of the population, and the general and infant mortality rates.

**HOW MANY OFFSPRING?**

| | Genders* | | | | | |
|---|---|---|---|---|---|---|
| Flux | 1 | 2 | 3 | 4 | 5 | 6 |
| -5 | Child | Child | Child | Child | Child | Child |
| -4 | Child | Child | Child | Child | Child | Child |
| -3 | Child | Child | Child | Child | Child | Child |
| -2 | Child | Child | Child | Child | Child | Child |
| -1 | Child | Child | Child | Child | Child | Child |
| 0 | Child | Child | Child | Child | Child | Multiple |
| +1 | Child | Child | Child | Child | Multiple | Multiple |
| +2 | Child | Child | Child | Multiple | Multiple | Multiple |
| +3 | Child | Child | Multiple | Multiple | Multiple | Multiple |
| +4 | Multiple | Multiple | Multiple | Multiple | Multiple | Multiple |
| +5 | Multiple | Multiple | Multiple | Multiple | Multiple | Multiple |

* All Genders, not participating" Genders.

Multiple= 1D infants.

**MUTATIONS**

Genes can change due to mutations. Mutations can make Genes Dominant or Recessive, or increase or decrease their values.

Roll on the Mutations Table during UPP creation for each possible Gene. Thus, mutation may convert a parent's Gene from an existing Recessive to Standard and make it available for contribution (although it may not ultimately be selected).

Dominant applied to a Recessive makes it Standard. Recessive applied to a Dominant makes it Standard.

A Gene can be reduced to zero and represents a defective Gene or genetically transmitted disease. Genes can be increased above 6.

**Other Effects:** Dominant Genes are always selected over Standard or Recessive Genes. If more than one Dominant Gene is available from parents, one of the Dominants is selected randomly.

Recessive Genes are never selected if Standard or Dominant Genes are available. If only Recessive is available, one of those available is selected randomly.

**Mutation Risk.** Individuals subject to high levels of radiation or hazardous chemicals are considered High Risk and a have a greater chance of mutation.

High Risk individuals are those who have been exposed to situations which have a higher likelihood of inducing mutations. They include Engineers (because of long-term exposure to drive radiation), non-natives on worlds with tainted atmospheres, and non-natives on worlds with high energy stars (type O B A and F).

**MUTATION TABLE**

| Flux | Standard | High Risk | Solitaire Gender |
|---|---|---|---|
| -5 | - 1 | - 2 | Recessive |
| -4 | - 1 | - 2 | - 1 |
| -3 | Recessive | - 1 | - 1 |
| -2 | | Recessive | |
| -1 | | | |
| 0 | | | |
| +1 | | | |
| +2 | | Dominant | |
| +3 | Dominant | +1 | +1 |
| +4 | +1 | +1 | +1 |
| +5 | +1 | +2 | Dominant |

This table is used for each Gene when it is transmitted to an offspring.

Solitaire gender rolls on the Solitaire column in addition to the Standard or High Risk column.

**GENEERING**

Genes can be edited using a variety of medical techniques. Gene editing (Geneering) is one rationale behind Acquired Characteristic Increases in Character Generation.

For a variety of reasons (including game balance), edited genes are Recessive.

Character generation increases in characteristics which meet this criterion: an individual who receives genetic change in C1, C2, C3, C4, or Instinct has that Gene marked Recessive. That does not prevent such a Recessive from later becoming Standard or even Dominant through various mutations.

**CLONING**

A clone is an individual created using the Genes from one single parent. A clone is the same gender (and genetic Caste) as the parent.

Although a clone begins with the Genes of the one parent, it then rolls Generated D normally. Thus, several clones with the same Genes may exhibit a variety of final UPPs.

**CROSS SPECIES INTERACTIONS**

There is no common ancestor for all life in the universe. Life has evolved independently from the primordial soup on many, many worlds. Nevertheless, parallel evolution has produced life forms which are similar in biochemical and genetic structure.

There are, therefore, many different possible structures for genetic transmission of inherited characteristics. The human structure is DNA. Other conceivable structures involve alternate combinations of amino acids, triple helices, and even quadruple helices.

**The Genetic Profile.** The initial letters of the characteristics for a species create the Genetic Profile. The human Genetic Profile is SDEIES. There are 81 different possible combinations in the Profile, representing the 81 possible Genetic processes governing life forms.

Many others are also possible (envisioning even other details of Characteristics), but they are omitted from this

discussion.

**Alien versus Similar.** Two organisms or species which share the same Genetic Profile are **similar**. Two organisms or species which have different Genetic Profiles are **alien**.

**Interspecies Fertility.** Members of two distinct species are inter-fertile (and can create children) if they both have the same Genetic Profile and the same Nucleic Acid structure (ie, DNA, 4NA, etc). The result of interspecies fertility is **chimera**.

Interspecies fertility creates offspring which share some of the details of each species, including senses, body structure, and other elements. In the majority of cases, such offspring is non-viable. When it is viable, it is often sterile. When viable and non-sterile, it breeds true with other viable, non-sterile.

**Bacterial or Microbial Infection.** Disease bacteria (and other microbes) can infect a species if they both have the same Genetic Profile. The result is a disease for the victim organism. It follows that a species is immune to infection from a bacteria that does not share the same Genetic Profile.

Non-infectious disease can be caused by alien bacteria. The bacteria do not attack the victim organism, but its presence produces toxins which burden the victim.

**Viral Infection.** A virus can infect a species if they both (the virus and the species) have the same Genetic Profile. Virus with an alien Genetic Profile cannot infect an organism.

**INHERITANCE OF C5**

The Learning characteristics Education and Training are not inherited. Each is generated individually.

Instinct is an inherited characteristic.

**INHERITANCE OF THE SOCIAL CHARACTERISTIC**

The Social characteristics can be inherited, but they are transmitted socially rather than genetically.

**Social Standing.** The children of parents with Social Standing inherit a value one less than the highest Social Standing held by the parents. Upon the death of the higher (or highest) Social Standing parent, one child inherits that parent's Social Standing.

**Charisma.** Charisma is not inherited. Each child generates an individual Charisma.

**Caste.** Caste is not inherited. Each child generates Caste individually.

**INHERITANCE OF MONEY**

Children routinely inherit the assets of their parents when the parents die. The details of inheritance are prescribed by local culture, law, and the Referee.

**THE GENETIC PROFILES**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 01 SAEIEC | 10 SASIEC | 19 SAVIEC | 28 SDEIEC | 37 SDSIEC | 46 SDVIEC | 55 SGEIEC | 64 SGSIEC | 73 SGVIEC |
| 02 SAEIEK | 11 SASIEK | 20 SAVIEK | 29 SDEIEK | 38 SDSIEK | 47 SDVIEK | 56 SGEIEK | 65 SGSIEK | 74 SGVIEK |
| 03 SAEIES | 12 SASIES | 21 SAVIES | **30 SDEIES** | 39 SDSIES | 48 SDVIES | 57 SGEIES | 66 SGSIES | 75 SGVIES |
| 04 SAEIIC | 13 SASIIC | 22 SAVIIC | 31 SDEIIC | 40 SDSIIC | 49 SDVIIC | 58 SGEIIC | 67 SGSIIC | 76 SGVIIC |
| 05 SAEIIK | 14 SASIIK | 23 SAVIIK | 32 SDEIIK | 41 SDSIIK | 50 SDVIIK | 59 SGEIIK | 68 SGSIIK | 77 SGVIIK |
| 06 SAEIIS | 15 SASIIS | 24 SAVIIS | 33 SDEIIS | 42 SDSIIS | 51 SDVIIS | 60 SGEIIS | 69 SGSIIS | 78 SGVIIS |
| 07 SAEITC | 16 SASITC | 25 SAVITC | 34 SDEITC | 43 SDSITC | 52 SDVITC | 61 SGEITC | 70 SGSITC | 79 SGVITC |
| 08 SAEITK | 17 SASITK | 26 SAVITK | 35 SDEITK | 44 SDSITK | 53 SDVITK | 62 SGEITK | 71 SGSITK | 80 SGVITK |
| 09 SAEITS | 18 SASITS | 27 SAVITS | 36 SDEITS | 45 SDSITS | 54 SDVITS | 63 SGEITS | 72 SGSITS | 81 SGVITS |

| C1 | C2 | C3 | C4 | C5 | C6 | |
|---|---|---|---|---|---|---|
| **S= Str** | A= Agility | **E= Endurance** | **I= Intelligence** | **E= Education** | C= Charisma | **Bold** = |
| | **D= Dexterity** | S= Stamina | | I= Instinct | K= Caste | Human. |
| | G= Grace | V= Vigor | | T= Training | **S= Social Standing** | |

**GENDER SYMBOLS**

| **Z*** | **X** | **C** | **V*** | **B** | **N** | **M*** | **<** | **>** | **?** | |
|---|---|---|---|---|---|---|---|---|---|---|
| Solo | Gender Two | Gender Three | Gender Four | Gender Five | Gender Six | Gender Alt One | Gender Alt Two | Gender Alt Three | Strange | Gender Symbols |
| Female | Male | Neuter | Egg Donor | Activator | Bearer | Gender Alt Four | Gender Alt Five | Gender Alt Six | Bizarre | |

Gender symbols are used when necessary. The symbols correspond the standard sophont genders FMN EAB 123456. Alt-123456 may be used when necessary. This font is T5-9000 Symbols.ttf. The upper row is CAPS; the lower row is lower case.