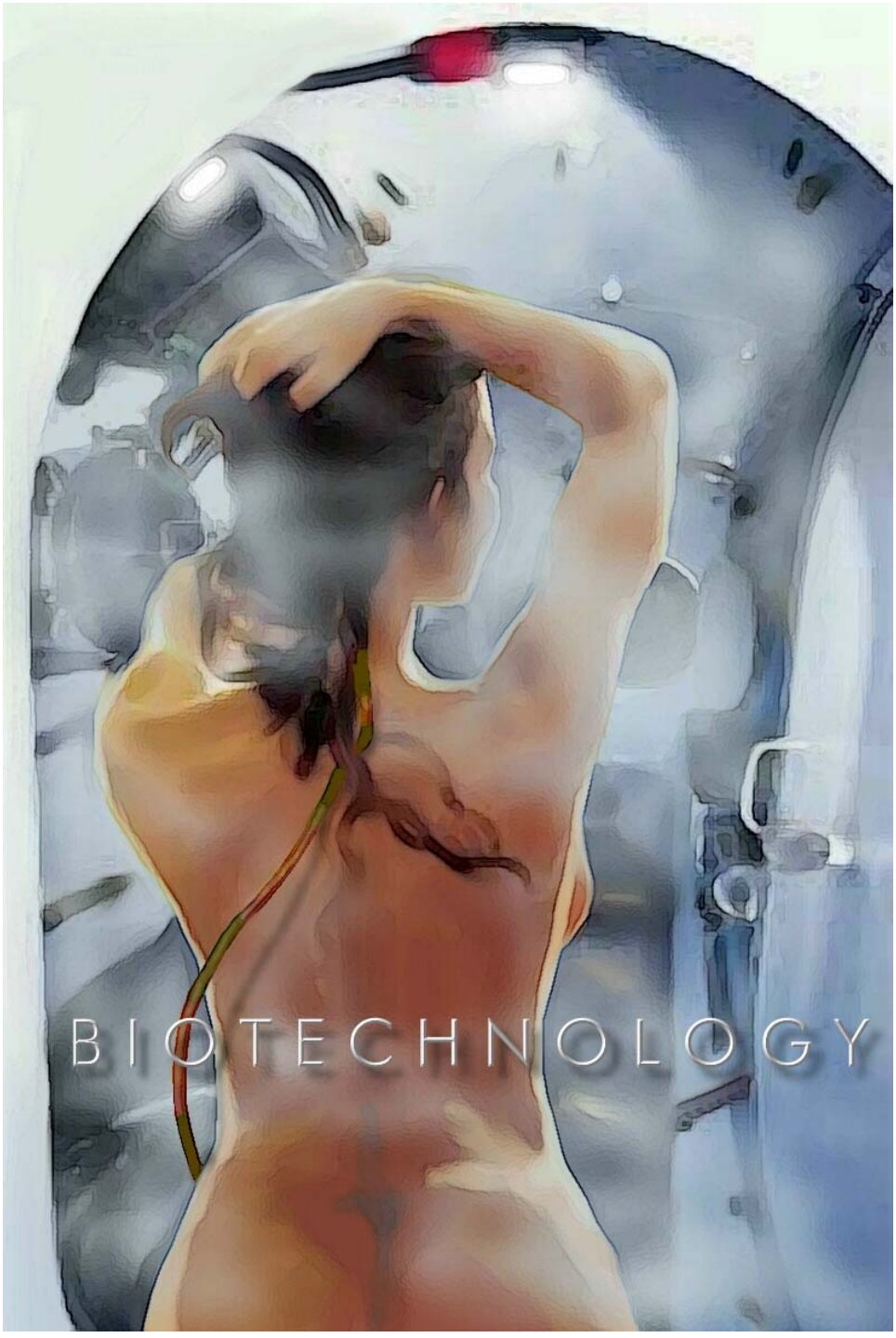
STARCLUSTER - BIOTECHNOLOGY



STARCLUSTER

BIOTECHNOLOGY

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Biotechnology as well as engineering technology in StarCluster is linked to the Tech Levels of the civilization. At higher tech levels, more advanced biotechnology is available. However the degree and manner in which biotechnology is used varies widely between cultures at the same tech level. Religious, moral, and aesthetic concerns limit the extent to which biotechnological possibilities are put in to practice in a society. Many societies eschew all biotechnology that is seen to change the basic nature what it is to be human and technologies that require the death of some individuals to extend the life of others.

By tech level 7, the first antibiotic and antiviral drugs become available. By tech level 8, death from naturally occurring infectious disease becomes rare, and cancer is readily and entirely curable. Death from disease now occurs mainly with genetically engineered bioweapons or exotic alien microbes.

At tech level 7, cloning first becomes possible, but the process becomes inexpensive and reliable at tech level 8. Also available at tech level 8 are artificial wombs. Societies that are so inclined are able to raise large numbers of genetically identical individuals. The choice between having children grown in natural or artificial wombs varies with time and society, rather as the choice between bottle and breast feeding.

At tech level 8, it is routine for everyone to have a complete analysis of their entire genome. It becomes possible to read out the genome at early stages of embryonic development (blastosphere stage) or even non-destructively as zygotes. This allows parents to have optimal offspring, the healthiest children that they are capable of producing. Most, but not all, tech level 8 societies would use this technology, some regarding it as immoral. It also becomes possible to choose genes from multiple sources, giving children that genetically have many parents and are even more genetically optimized. This technology tends to be less acceptable, but is practiced on a number of worlds. Using these technologies, after several generations the average life expectancy on most tech level 8 worlds is 100 years and the average IQ is 125.

At tech level 9, the creation of designer genes becomes practical. Humans can be altered to have characteristics previously unknown. Examples of modifications are cosmetic ones (fur, unusual skin, hair, and eye colors, enlarged body parts, etc.), enhanced abilities (greater intelligence, extreme musculature, sharper eyesight with increased spectral range, better hearing, greater singing range, increased psionic abilities, etc.), and enhanced health (greater lifespan). It can also be used to allow humans to live in planetary environments that are otherwise to harsh to support human life (too hot or cold, too high gravity, too thin or poisonous air, etc.). These genetic modifications can be quite expensive, however; and in many societies there is a dislike for those who are obviously genetically augmented, so inconspicuous augmentations are the rule in most cultures. The main uses are for increased intelligence and greater life span. In augmented individuals, the average IQ is 200 and the average life span is 250 years, eventual brain failure being the main cause of death.

At tech level 9, direct man-machine interfacing (jacking in) becomes practical, allowing direct control of computers and machinery and also direct sensory and memory input. Using this technology, many spacecraft are set up for direct neural control, having manual controls only for backup. It also effectively makes telepathy possible between consenting individuals. Some cultures eschew implanted interfaces, regarding them as unnatural; but in cultures where the practice is the

norm, jacked virtual reality displaces holography for entertainment, giving a more realistic experience. This technology also allows for robotic replacements for lost limbs, damages organs, or even the entire body except the brain. Cyborgs are thus possible, some individuals preferring mechanical replacement of body parts for their greater strength and durability. However, most cultures are uncomfortable with mechanical body parts, and most persons tend to prefer natural body parts.

At tech level 10, non-invasive magnetic induction has been refined to allow interfacing without the use of implanted jacks. This makes the use of such technology more socially acceptable.

Even as low as tech level 7, it is possible to electrically stimulate brain centers by inserting wires into the brain, producing specific sensations or emotions. The most common use is to stimulate the pleasure centers of the brain. Another possible use is torture by stimulating the pain centers. By tech level 9, these effects can be produced by magnetic induction without the use of implanted wires. In societies that allow its use, direct stimulation of the pleasure centers of the brain (wireheading) tends is preferred by hedonists to recreational drug use, being more pleasurable and having fewer physical side effects. However most societies reject wireheading, as its widespread use leads to cultural breakdown.

At tech level 9, it is also possible to grow and attach new limbs and organs, and this is usually socially preferred to robotic parts, even though more expensive and less capable. It is even possible to grow an entire new body and transplant the brain into it. This procedure is used in cases of extreme bodily damage or by wealthy persons wishing a different body, such as one that is younger or of a different gender.

Even at lower tech levels, some degree of man-machine interfacing is possible. At tech level 8, there is sufficient interface capability for some neural control of prosthetic limbs. However, at this tech level the tactile feedback is crude. It is also possible to insert robotic eyes, giving vision that is too poor for reading but sufficient for movement without running into objects. At this tech level, robotic replacements are grossly inferior to natural limbs and organs.

With either mechanical or biological limb replacement, there is a recovery period for mechanical skills to be fully recovered in the replaced part. Normally a year of rehabilitative therapy is needed for full recovery. Until that point, all physical skills with the replacement are reduced by -1. Without therapy, 5 years are required for full recovery of skills.

At tech level 9, animals as well as humans can be genetically augmented. It becomes possible to breed monkeys, dogs, etc., that have human intelligence and can speak. In some societies that use this technology (many do not), the augmented animals have full status as citizens. In other cultures they are chattel slaves. At tech level 10, it is possible to create synthetic persons (androids), including ones suitable for living in extremely man-hostile environments. As with augmented animals, their status varies widely from world to world.

Plants are genetically improved. At tech level 8, plants can be breed that produce foodstuffs abundantly in small volumes, making it practical for spacecraft to carry their own minimal-maintenance gardens for food production. At tech level 9, there are engineered biocultures for producing the main foodstuffs directly by microbial culture (bread flour, tomato sauce, etc.).

At level 10, in a technology related to that used for matter transmission, it becomes possible to scan and transfer minds. This makes possible an indefinite lifespan, the mind being transferred to a new younger brain and body. (Accident and homicide remain as causes of death, even with this technology). This technology has great moral difficulties, as a younger body and brain must be obtained for the transfer. Many societies use special grown frozen clones of the individuals that have never been allowed to become conscious, but some societies regard this as murder, particularly since at this technological level the existence of the soul of a comatose clone is an established objective scientific fact, rather than a religious conjecture. The technology can also be used for other purposes, such at swapping minds (even with alien creatures) and creating persons whose mentality is a composite of a number of other persons. This technology is not without risk, the more extreme uses having considerable dangers. This technology is covered more extensively in the section of Matter Transmission And Mind Transfer.

At tech level 8, human hibernation becomes practical. The body is cooled to just a few degrees above freezing and aging slows to 5% of normal. This technique allows tech level 8 cultures to have interstellar travel; it is just very slow. It takes 1 hour to enter hibernation, and one hour to reawake. Hibernation is not free of danger: there is a 0.1% mortality rate while in hibernation.

At tech level 9, human freezing and reviving becomes practical. The body is frozen and held at just a few degrees above absolute zero. Aging stops. It takes 1 hour to freeze a person, and 1 day to revive them. Frozen bodies require less care and support equipment than hibernating ones, so it is the cheaper technique than hibernation for tech level 9 and above. Freezing has a mortality rate of 0.01% while in a frozen state.

At tech level 10, matter transmission and mind transfer technology makes possible to transition individuals between awake and frozen states in a fraction of a second, though with all the dangers associated with this technology. At this tech level stasis field technology exists, and is usually used in preference to hibernation and freezing.

TECHNOLOGY SUMMARY BY TECH LEVEL

TECH LEVEL 8

- NEAR ELIMINATION OF DEATHS DUE TO CANCER AND BACTERIAL AND VIRAL INFECTION
- GENOME OPTIMIZATION, AVERAGE IQ=125, AVERAGE LIFE SPAN=100 YEARS.
- PRACTICAL CLONING, ARTIFICIAL WOMBS.
- HIGH PRODUCTION GARDENS.
- HIBERNATION.

TECH LEVEL 9

- GENETIC AUGMENTATIONS, AVERAGE AUGMENTED IQ=200 AND LIFE SPAN=250 YEARS.
- UPLIFTED ANIMAL SPECIES.
- DIRECT MAN-MACHINE INTERFACES (JACKING IN).
- MECHANICAL LIMB REPLACEMENTS. CYBORGS.
- GROWN AND GRAFTED LIMB REPLACEMENTS. BODY TRANSPLANTS.
- TAILORED MICROBIAL FOODSTUFFS.
- BODY FREEZING AND REVIVAL.

TECH LEVEL 10

- SYNTHETIC PERSONS (ANDROIDS).
- NON-INVASIVE MAN-MACHINE INTERFACING.
- MIND TRANSFER, INDEFINITE LIFESPAN.

AUGMENTATION

Augmentation is the use of biotechnology pre-birth. As augmentation is engineered in before the character is born, all augmentation depends on the character's parents. The character's RANK score is used to determine whether there is any augmentation. The character can always refuse augmentation, although these choices are made for the character by their parents, the players act in the stead of the character's parents.

The character gains augmentations at certain levels of RANK. At RANK level B, the character gains one Low Level Augmentation from the appropriate tech level or lower. At RANK level F, a second Low Level Augmentation is gained. At RANK level L, the character gains one High Level Augmentation, and at RANK level N, a second high level augmentation is gained.

TECH LEVEL 8

LOW LEVEL AUGMENTATIONS:

IQ+10, STR+1, COOR+1, AGY+1, END+1, CHAR+1

HIGH LEVEL AUGMENTATIONS:

IQ+30, STR+3, COOR+3, AGY+3, END+3, CHAR+3

TECH LEVEL 9

LOW LEVEL AUGMENTATIONS:

IQ+25, Exotic Appearance, Enhanced Sense, Fast Healing, Extraordinary Leaping, Exquisite Balance

HIGH LEVEL AUGMENTATIONS:

IQ+50, Innate Weaponry, PSI+1, Burst of Strength, Burst of Speed, Gills, Arbitrary Shape

DESCRIPTIONS OF AUGMENTATIONS

EXOTIC APPEARANCE:

The character can be any humanoid biped form desired. Skin covering (hair, fur, feathers, scales) is totally arbitrary.

ENHANCED SENSE:

The character has one sense enhanced far beyond human norm. Choices are *sense of sight* as an eagle, *sense of hearing* like a cat, or *sense of smell* like a bloodhound.

FAST HEALING:

The character heals at three times the base rate of 20 constitution points per day. This means the base rate for the character is 60 constitution points per day before drugs or medicine are used.

EXTRAORDINARY LEAPING:

The character is able to leap 2 meters off the ground straight up in a 1G environment. Character is also able to leap 10 meters in a running broad jump, and 6 meters in a standing broad jump.

EXQUISITE BALANCE:

The character is able to perform feats of balance equivalent to a trained circus performer. The character is utterly at home moving in zero G environments

INNATE WEAPONRY:

The character has either retractable *claws*, or sharp *teeth*, either of which do 20 additional points of damage in unarmed combat. The character also has innate unarmed combat skill of +1

BURST OF STRENGTH:

The character has control of secretion of adrenaline and other internal chemicals, and is able to perform strength feats equivalent to flipping over a ground vehicle of up to one and a half tons, once per day.

BURST OF SPEED:

The character has control of adrenaline and other internal chemicals, and is able to speed up in relation to the outside world once per day for a period of 3 minutes (3 rounds). During this time the character may perform 3 times the normal actions the character could do. In other words, if the character has blade+5 and is able to attack twice per round, the character may instead attack six times per round.

GILLS:

The character is able to breathe water as well as air at will, due to use of a set of gills as well as lungs. This augmentation is particularly appealing to Vantors, and to a lesser extent, Tagris.

ARBITRARY SHAPE:

As Exotic Appearance, except that the character is not limited to humanoid shape. Extra limbs, fins, wings, whatever is wanted is possible.

TREATMENT OF THE AUGMENTED

Augmented characters are hated and feared in certain societies, and in certain parts of any society. Some religions forbid augmentation, and most look on it with suspicion. Obvious augmentation may get the character into trouble just for being augmented. More subtle augmentation is less intrinsically objectionable, but is all the more hated as there is a certain feeling of trickery and deception there - "Imagine the nerve of that creature, pretending to be human!".

This hatred of the augmented is more prevalent in the Diasporan Community than in SaVaHuTa, but is strong even there in places. Eccentricity is traditionally more tolerated in the fringes of these societies, especially among artists, musicians and actors. Generally, if the augmented keep to these areas, they are fairly safe even in those societies disapproving of augmentation.

There is no way for augmentation of the Tech Level 8 sort to be detectable. That is merely an increase in what is already there, and certainly falls within the biological norms of any human based society. Tech Level 8 Augmentation can be done at Tech Level 9 as well, and is a popular form of augmentation at any Level. Tech Level 10 has no special forms of augmentation, the focus of those societies having shifted to modification after birth., but all previous forms of augmentation are available.

ANDROIDS AND ANIMALS

Androids are synthetic creatures, and as such are not created by combining existing fragments of DNA, but by creating the DNA itself. This requires profound knowledge of the genome, and give arbitrary power over the designer of the genome. Androids are not necessarily "human" at all. There are "animal" androids created for specific purposes, which may not be sentient at all. Most people, though, when talking about Androids really mean artificial "humans".

A good guide to how a society treats Androids is how it treats sentient Robots, as both are artificial sentient forms of life. In the Diasporan Community, chattel slavery of non-humans is left up to the world in question, and is not decided on the larger level, much like the USA before the Civil War. Also, "human" is used with a very narrow definition, which does not consider - for instance - Vantors, Sastras, or Tagris to be human, regardless of the 99% genetic identity of these species with humanity. In SaVaHuTa, any sentient is considered the equivalent of human, and chattel slavery of human is outlawed. Instead a form of indentured servitude is practiced, where the sentient pays back the person who financed it's creation in service, and at the end of that time are legally freed. This system is open to abuses, but most people adhere to the spirit as well as the letter of the law.

A Player can choose to be an Android. If so, schooling can be charged to his "account", which he will later "pay off" (if SavaHuTan) or can be paid for by his owner (if of the Diasporan Community). Androids can be very similar to humanity, or very different, as the player chooses. Any differences from the human should be negotiated with the Game Master, to ensure a balanced character. All Android Character have otherwise a RANK of 1. All Androids by definition come from Tech Level 10 societies, as the necessarily profound understanding of the genome required to produce true artificial persons does not exist until that point. In general, Androids do not reproduce.

Another interesting background choice is that of uplifted animal species. An animal species would only be uplifted if it fit certain criteria. One would be near human size, thus elephants and whales were never uplifited. The second criterion would be usable or easily modified manipulators. The third criteria was that the animal be fairly intelligent to begin with. This meant that Earth creatures uplifted were such animals as bears, dogs, large cats, apes, baboons, raccoons, and drills. Non-earth creatures were also uplifted, as encountered.

Uplifting entails increase of intelligence, modification of manipulators (hands), means of communication (voice), and change from quadruped to upright stance (to free the hands). Otherwise the animals retained their own characteristics. Some animals need very little uplift, like chimpanzees and dolphins. Others need quite a lot. Dolphins, for example basically need manipulators, as they only have a mouth to start with. One of the key innovations in the dolphin uplift was a set of ceramic mechanical hands drawing power from the dolphin and foldable into a streamlined packet made to minimize drag. Other than that, small genetic changes to the vocal chord to enable conversation were all that was required. With chimps, a small increase in the frontal lobe, vocal enhancements, and a more upright stance made an enormous difference.

Players may choose to play uplifted animal characters as they wish. All the caveats on androids are germane here also. Animals were uplifted for reasons, many of which had to do with being good servants or soldiers or workers or something else that humans didn't want to do but had to be done. The problem is, of

course, that by uplifting them, making them sentient enough to be good servants, also made them sentient enough to understand their situation, and they grew to resent it and ultimately challenge it. Remember, uplifted animals are changed through enhancements in their genetic structure, and those changes are inheritable.

For game purposes, uplifted animals are treated as humans for the most part, with changes as the player and GM think necessary to fit the particular situation. Tools and equipment will need structural changes, and some things just will not work. For instance, an uplifted Flying Fox (the only bat large enough to uplift) cannot wear heavy armor and expect to fly!

Following are some commonly uplifited animals. Use these as templates for your own ideas. Uplifted animals come from a society at least at tech level 9. Bonuses and penalties apply to scores at birth. Adjustments after birth are open ended.

UPLIFTED ANIMALS

CHIMPANZEE

STR: +1 Natural Weapon: Teeth
COOR:+0 Damage: +10
AGY: +3 Enhanced Sense:Smell
END: +2

Uplifted chimpanzees are the most common form of uplifted animal. The can easily use human tools and most human equipment. They enjoy the company of humans and are sociable animals. They have much in common with Sastras, and are commonly found in their company.

DOLPHIN

STR: +3 Natural Weapon: Ram
COOR-3: Damage: +20
AGY: +3 Enhanced Sense: Hearing
END: +0

Dolphins are the only uplifted animal listed here to require mechanical prosthetics. They are highly social creatures, and are found in almost every earth-type world's ocean. There are a number of different species, and even some fresh water types. Dolphins and Vantors get along very well. Most Vantor settlements have dolphin pods associated with them. Fresh water dolphins are also to be found in many Tagris settlements, those built in large lakes or rivers, anyway. They were the second species to be uplifted, after chimpanzees, and are the second most common uplifted animal. They personally do not consider themselves as having been uplifted, as dolphin brains are unchanged. They prefer to think of it as a trade of hands for service.

DOG

STR: +0 Natural Weapon: Teeth
COOR:-3 Damage: +20
AGY: +1 Enhanced Sense:Smell
END: +1

Dogs were also an early uplift. There are many breeds of dog, but only the most intelligent were selected for uplift. Dog hand-paws are less suited to small item manipulation than some animals. Dogs get along wonderfully with humanity, and their keen senses of hearing and smell are particularly useful in police work, customs, and the military. Dogs are a hierarchial creature, and their social organizations are very strict, but fluid.

COUGAR

STR: +0 Natural Weapon:Teeth, Claw
COOR:+3 Damage: +20, +10
AGY: +1 Enhanced Sense:Smell
END: -3

Cougars are solitary creatures, and were uplifted for roles which suit this personality. Ranger, Explorer, Spy, Athlete, and Asteroid Miner are suitable jobs. Cougars dislike a lot of social interaction, and don't particularly care for humans.

RACCOON

STR: +0 Natural Weapon: Teeth
COOR:+2 Damage: +0
AGY: +3 Enhanced Sense:Hearing
END: +0

Coons are charming rogues. They enjoy puzzles and challenges, and have a very small appreciation for personal property. They make lovely Thieves of any type.

BEAR

STR: +3 Natural Weapon: Teeth, Claw
COOR:-3 Damage: +10, +15
AGY: -2 Enhanced Sense:Smell
END: +2

Bears are not social creatures. They prefer to work alone, and do not work well with others. They can be irascible and easily disturbed. They are keen observers of nature, and enjoy working in the outdoors.

MODIFICATIONS

Modifications are changes made to the character after birth. These changes are not genetic in nature and are not passed along to any offspring. In general terms, there are two types of modifications. The first are called *Implants*. Implants are devices placed inside the body which interface naturally and seamlessly with the body's processes, becoming effectively as natural to use as the body's own structures. The second type of modifications are called *Replacements*, which are changes to the body using natural body parts.

IMPLANTS

Implants in game terms always have both a positive and a negative effect. In discussion of each type of implant available, both positive and negative aspects of the implant will be pointed out. There is a cost associated with the implant, both in time and in money. The time cost is the time required to integrate the implant into your body system. The tech level when the implant is first available is listed as TL. Following are some of the available implants. The GM is encouraged to create new implants, using these examples as templates.

JACKS

Monetary Cost: 2000cr
Time Cost: 1 year
TL:9

BENEFITS:

Allows direct interfacing to computers and computer related devices. A bonus of +20% on all programming tasks is awarded, and all computer related tasks are simpler and faster. Jacks allow very precise control of computers and stations, and can make the impossible tasks possible.

DRAWBACKS:

If a computer goes down while jacked in, the character rolls %d. A roll of 50% or over means the character is stunned for 1 hour.

DESCRIPTION:

The Jack is a small round receptacle in the base of the skull where the head and neck join. There are a number of holes for pins, and the Jack is normally covered by a flap. A cable is used to join the character and the computer in question. The Jack is functionally equivalent to a robot's *interface*.

BALLISTIC ARMOR

Monetary Cost: 500cr
Time Cost: 1 mo.
TL:8

BENEFITS:

The character has fiber mesh implants placed subcutaneously over vulnerable areas of the body. This gives the character an effective armor of ballistic type at all times.

DRAWBACKS:

The mesh implants and scar tissue dull the sense of touch wherever they are placed, and the attendant stiffening of the body reduces the character's agility by 2.

DESCRIPTION:

Subcutaneous fiber and scar tissue pads which protect vulnerable body areas.

A-GRAV

Monetary Cost: 10000cr
Time Cost: 1 year
TL:10

BENEFITS:

Allows the character to effectively fly.

DRAWBACKS:

Requires a lot of power, thus needs a stasis-bottled matter-antimatter reaction implant. This increases character mass and renders the character visible to certain scans.

DESCRIPTION:

An A-Grav generator and Matter-Antimatter bottle implanted in the body, with sufficient power to lift twice the character's mass for 100 hours of flight. Speed is determined by constant thrust over time. The A-Grav field is

generated from a net of emitters located all over the body in a subcutaneous layer.

COMMUNICATIONS

Monetary Cost: 300cr
Time Cost: 1 week
TL:8

BENEFITS:

Allows communications directly without a carried device.

DRAWBACKS:

Needs relays for Surface to Orbit or more than line-of-sight transmission.

DESCRIPTION:

A sub-vocal microphone is implanted in the larynx along with two sub-miniature speakers in the ears. A comm scanner/booster is located in the abdomen. Control is via tongue activated microswitches in cheek pads. At TL 10 a thought controlled unit is available for the same price.

COMPUTER

Monetary Cost: 5500cr
Time Cost: 1 year
TL:10

BENEFITS:

The character's mind has data storage, retrieval, and processing/analysis capabilities equal to a computer, and if Jacked, can interface seamlessly with other computers, with direct perception of all data and streams. The user is present in both the real world and a virtual world simultaneously, able to see things as actual and/or as data constructs.

DRAWBACKS:

The character has a tendency to over analyze real world data, thus appearing cold to non-interfaced people, and tending to hesitate for a moment for analysis where others might go ahead on gut feeling. Also dual stream perception of both real and virtual world can be confusing and possibly conflicting.

DESCRIPTION:

Implanted computer uses ultra-dense crystal data storage and holographic access techniques, along with data stream sampling. Computer is powered by body heat differential.

EXTENDED SENSES

Monetary Cost: 500cr
Time Cost: 1 year
TL:8

BENEFITS:

Character gains access to improved sensory input with either (character's choice) Infrared Vision, Ultraviolet Vision, Distance Vision (20X), Enhanced Smell, Low Frequency Hearing, or High Frequency Hearing.

DRAWBACKS:

Perception of extended ranges of radiation means increased sensitivity to those ranges. Some things ordinary people perceive normally can be acutely painful.

DESCRIPTION:

Various techniques are used to boost the acuity or range of sensual sensitivity.

GILLS

Monetary Cost: 300cr
Time Cost: 6 mo.
TL:9

BENEFITS:

Ability to breathe oxygen dissolved in water as well as air.

DRAWBACKS:

Forgetting to switch over and attempting to breathe normally under water is common, particularly in stressful situations.

DESCRIPTION:

Blood shunt changes circulation pattern from lungs to artificial gills on chest. Shunt is manually switched up to TL 10.

NATURAL WEAPONRY

Monetary Cost: 500cr
Time Cost: 1 mo.
TL:8

BENEFITS:

Extra damage gained in unarmed combat. Certain varieties are also useful in non-combat situations, such as retractable claws used to climb trees.

DRAWBACKS:

Being disarmed can get painful. Also, poison weapons can be self-injurious, as unlike naturally poisonous creatures, characters are not immune to their own poison.

DESCRIPTION:

Various types are used, sharp teeth, poisonous hollow fangs, retractable claws, poison spurs, etc. The DM should adjudicate design and use.

OXYGEN SCAVENGER

Monetary Cost: 200cr
Time Cost: 6 mo.
TL:8

BENEFITS:

Allows direct breathing of thin atmosphere.

DRAWBACKS:

Changes blood chemistry, thus rendering some drugs inert and others poisonous.

DESCRIPTION:

Changes in blood chemistry allow scavenging of oxygen at far lower partial pressures.

REPLACEMENTS

Replacement technology is an outgrowth of both cloning and stem cell research. Limb replacement occurs at TL 9, and can either take the form of a clone grown with all but the particular limb suppressed, then the limb harvested, or stem cell budding and regeneration of the lost limb. With complete knowledge of the human and individual genome available at TL 9, either method will work. Both take approximately a month to complete, with induced growth through field stimulation and growth hormone, and a year for necessary reintegration of the new limb through physical therapy. The new limb has no living-induced callouses or scars, and the skin is as delicate as a baby's. It takes from 3 to 5 years for the regenerated limb to look appropriately weathered enough not to be conspicuous. The player can elect not to undergo physical therapy for a year, instead choosing to have a lessened effectiveness with the affected limb for the next 5 years.

Characters losing limbs in the Military can expect free replacement. The military, however, replaces limbs with robotic prosthetics rather than cloning or regeneration. To the military, the prosthetics are far more useful than mere skin, and since the character lost the limb anyway, might as well replace it in a manner best suited for the military. If the character wishes tissue replacement, the character must pay for it. Cost of limb replacement is 1000cr. Cost of eye replacement is the same. Replacement insurance can be purchased for 25cr per year, but that is cost effective only for younger characters.

MATTER TRANSMISSION AND MIND TRANSPLANTS

Research into the fundamentals of the Jump Drive came to fruition in the related technologies of Matter Transmission and Mind Transplantation. All three technologies involve the relocation of something from place to place without movement, and all three are based on the Transfer skill. The navigation of a Jump Ship is a very subtle blending of psionics and technology. The Jump Field isolates the ship from the universe, causing it to be "nowhere". The Navigator, by amplified psionics, establishes herself to be somewhere else, pulling the navigator's body, and thus the rest of the ship, with it. From this, it became apparent that there is a non-material aspect of the person which is the actual center of being. Religions call this the "soul", scientists call it the "self", but it is the same thing. The soul or self is the repository of continuity, where actual sentience resides. This soul has strong connections with the body, which are used in Transfer to pull the body and its environment along with it.

Matter transmission is accomplished with MatTran cells. A MatTran cell establishes a field similar to the field of Jump Drive. The operator, using Transfer skill, finds the destination MatTran cell and establishes a harmonic link between the two. The link causes the contents of the cell to be located with equal probability at either location. The MatTran operator then collapses the link in favor of the desired position.

PSI increases the range at which the link may be made. At PSI 1, the two cells must be in the same basic orbital position (in the StarCluster-specific sense of the term - see the Star Travel guide for details) as each other. For each PSI beyond one, the range between the two cells may be one larger, so that with a PSI rating of 3, cells can be linked between - say - the surface of a planet and a moon in orbit position 2. The surface of a primary is always considered orbital position zero, and thus any two points on or near the surface of any one world can be linked by nav operators with a PSI of 1.

Transfer skill mitigates the damage done by the transmission. There is *always* damage done in a MatTran transmission. The question is "what is the severity of the damage?", not "Is there any damage?". When using MatTran, please use the "Translation Table" appended. This will tell you what was lost in the translation. These losses range from skills to characteristics to possible death. These losses are acceptable for emergency translation, or for military purposes, but tend to weed out casual use of the MatTran as a mode of transportation.

Mind Transplants use the same basic physics as Jump Drive and MatTran. A field similar to the jump field is formed around the donor, the recipient, and the operator. Then a destructive memory scan is made of both brains, wiping the memories clean. The operator uses the interrogate skill, but with great amplification within the field, for this phase. Next, both souls are relocated using the navigation skill. Then the memory scan operation is reversed, flooding the memories of the old persona into the new bodies.

This basic operation can be done in many ways. For instance, two thrill-seekers can exchange bodies with each other. An old person can gain virtual immortality by translating into a young body. Two (or more) souls can share a single body. The soul of a human can be placed into an animal. The catch, of course, is that with any translation there is data loss, and the more complex the operation, the more data is lost. When undergoing such an operation, use the "Translation Table" appended. Higher interrogation skill mitigates the damage done by the memory scan to some extent.

It is illegal in any humanoid state to coerce another into any such switching, but not only does the fact of it being illegal present no real barrier to the wealthy or the determined, there are ways around any law. Consider an elderly person wishing to stay alive. If the person is wealthy enough, one has several choices of legal routes to immortality. One may compensate the body donor sufficiently so that the arrangement is freely entered into. A lot of credits for one's family can make even premature death look attractive. One may buy the body of a mindwiped criminal in certain states, and swap bodies. Another common method is legal in some places, and entails growing a clone of the transferee and blocking all sensory input while the clone is growing, thus presenting a tabula rasa to the new body inhabitant.

All of these possibilities are to many people morally repugnant, especially since the confirmation of the existence of a soul has strengthened most religions, and their societal power. While the existence of the soul is definitely proven, there is no scientific evidence that the soul is immortal, or that it survives bodily death, other than when being transferred as shown above, or other postulations concerning the soul like an afterlife. The only thing known about the soul is that it is the repository of individual continuity, and a one-to-one relationship exists between persons and souls. All sentient creatures have souls: humanoid, self-aware robot, alien, or uplifited animal.

CLONES

Clones are no more than genetically identical twins of different ages. Cloning a person does not clone her soul, nor her memories. Cloning is viable at tech level 8, and can be used for various purposes. Cloned humanoids are generally vanity children. That is, as copies of the parent, the clones appeal to the parent's vanity. As only one person is required, unlike conventional children, cloned vanity children appeal to the single parent.

Another use for clones is, of course, as a source of spare parts. Manipulating clones so that only necessary parts grow is outlined under "Replacements", above, and growing mindblank clones is discussed under Mind Transfer. Some human societies practice "downshifting", which is the opposite of "uplifting". With downshifting, one creates deliberately microcephalic sterile clones or androids for use as laborers and servants. This essentially creates humanoid animals, as uplift makes animals more human. Downshifted clones are non-sentient, and are not counted as slaves in SaVaHuTa. Many societies ban downshifting and/or prohibit the importation of downshifted individuals, but in other societies downshifting has proven quite popular.

Cloning has also been used by some totalitarian societies to produce large numbers of individuals of a particular type (e.g., a perfect soldier, a perfect servant), once they have found or created a single individual that they regard as a perfect example of the type. There have also been religious cults where many or all the children raised are clones of a leader regarded as semi-divine. Some celebrities are cloned by parents interested in raising their role model as a child.

COLD SLEEP (PEEPSICLES)

There are 3 types of cold sleep available in StarCluster. The type used depends on the Tech Level of the culture in question. At Tech Level 8, cold sleep is a hibernation which slows down the metabolic rate so that a person under cold sleep ages much slower than normal, and consumes proportionately fewer resources such as air, water and food. At Tech Level 9, cold sleep involves the actual cessation of metabolic functions as the body is brought down to a very low temperature. At Tech Level 10, the sleep is not actually cold, as the body is placed in a stasis field and experiences no objective time as long as power is supplied to the unit. Peepsicles was an old slang term for a person in cold sleep which eventually became transferred to the unit itself.

In Tech Level 8 cold sleep, the process of getting a person into the hibernating state involves an hour long process of drugs, catheterization, and introduction of anti-freezing agents to the bloodstream. It is somewhat painful, but not unbearable, and the drugs do help. The sleeper ages very slowly, at a rate of one hour in twenty, and is kept alive by intravenous glucose drip. One in one thousand cold sleepers never wake, but instead drift away into an eventually fatal coma due to various reasons. Prompt medical treatment can possibly save the comatose sleeper, but requires successful diagnosis at -20% as well as successful treatment or drug use, as indicated, due to the murky understanding of the processes involved. The waking process itself takes another hour, as the effects of the sleep drugs and anti-freeze agents wear off. The patient is always numbingly cold during this process. Exercise helps, but is usually resisted by the numb, sleepy patient.

At Tech Level 9, cold sleep is a total frozen suspension of the sleeper's metabolism. The process is far less painful than the TL 8 process, and far quicker. The sleeper only requires an hour to suspend functioning entirely. The waking up process, however, is similar to that in TL 8, but takes approximately a full day to come to full alertness. The main complaint is a pins and needles feeling in the extremities and extreme grogginess, which passes away with time. One out of every 10000 TL 9 cold sleepers does not wake up, with the same consequences as in TL8, and the same treatment options.

At Tech Level 10, the process is almost instantaneous. The use of stasis fields allows the sleeper real comfort, in fact there is no cold, and there is no sleep. The user merely lies down on the bunk and the stasis field is activated. To the "sleeper" no time at all passes, and they are immediately up again, fully awake and functional. In the universe, years may pass, but the time spent in stasis is an eyeblink to the "sleeper". The stasis field is - in effect - a one way time travel device.

FOOD

Food is the most pressing problem in consumables with regard to living on space ships. In Tech Level 7 spaceships, intensive hydroponic gardens are able to feed 5 persons indefinitely per ton of allocated space. This is a practical limit for traditional hydroponic methods. It relies on a nominally closed system of recycling solid wastes and water, using radiation sterilization to maintain sanitary standards. The food is entirely vegetable, as animals are far too inefficient to use as a food resource. Diet is balanced by matching vegetable proteins from several sources such as rice and beans to achieve a complete protein spectrum. The hydroponic gardens also provide vital psychological boosts as well as assisting somewhat in freshening the air. The gardens are maintained by crew in off duty time, and the chores are for the most part avidly done,

even fought over. These hydroponic crops are supplemented by stored freeze-dried foods, principally meats and dairy products as well as occasional delicacies designed to relieve the monotony of ship-grown produce.

By Tech Level 8, advances in plant genetics double the yield of hydroponic sections. Single vegetable crops are available which contain the full spectrum of proteins needed. Design of new plant species for optimal yields, short growing times, and trace mineral uptake, as well as varieties of taste and texture, make ship-grown produce more palatable and variable. Large ships and stations are able to grow more than is strictly needed, and small designer animals, genetically engineered for efficient use of both food and space, are raised as meat supplements using the surplus. The surplus vegetables and meat are traded to visiting ships, and a self sustaining space borne agriculture is achieved.

At Tech Level 9, engineered microbes are available which take waste in solution and output various foods directly. This further increases the production density so that one ton of allocated space can produce enough to feed 15 persons, a tripling of the output of TL7 gardens. Many ships allocate space for small conservatories with non-food producing plants in abundance, which somewhat alleviates the psychological reasons for hydroponic food production. For diet variety, and for some psychological needs, hydroponic gardens continue to be used, but are no longer the main food producers.

At Tech Level 10, the main differences in spaceship food are the use of stasis fields to distribute food fully prepared, still hot from cooking, for variety and taste, stored and available on demand. While many people still prefer to practice cooking as an art form, the necessity of food preparation immediately in advance of consumption is alleviated. Stocking one's mini-galley stasis compartments with food prepared in station restaurants and bistros long before becomes an art form in itself.

TRANSLATION TABLE

Modified % Die Roll	Result
Less than 0	Loss of 1 random skill level
01-25	Loss of 2 random skill levels and incidental memory loss
26-55	Loss of 2 levels in a single skill and incidental memory loss
56-75	Loss of 3 random skill levels and moderate memory loss
76-88	Loss of 2 levels in 2 skills and moderate memory loss
89-95	Loss of 6 random skill levels and heavy memory loss
96-99	Loss of 3 entire skills and severe memory loss
100+	Mindwipe. Loss of all memories and skills

TRANSLATION TABLE MODIFIERS

MatTran Translation

Each + of nav skill	= -15
In same orbit	= -25
Good equipment	= 0
Excellent equipment	= -15
Poor equipment	= +15
Operator unfamiliar with process	= +25

Mind Transfer Translation

Each + of interrogate skill	= -15		
Subject known for at least a week	= -25		
Operator unfamiliar with process	= +25		
Good equipment	= 0		
Excellent equipment	= -15		
Poor equipment	= +15	Process interrupted	= +50
Trans-species	= +10	Trans-sex	= +5
Two souls into 1 body	= +15	Each additional soul	= +25