GURPS®
Fourth Edition

TransHuman SPACE™

BIO-TECH 2100™

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Rules and statistics in this book are specifically for the *GURPS Basic Set, Fourth Edition.* Page references that begin with B refer to that book, not this one.

INTRODUCTION

"Are you done, Hassan?" Mahmud as-Sulaymi spoke through his wearable system as he sat on a rock outcrop, surveying the stark beauty of the lifeless landscape.

"Almost, Father," Hassan replied politely. Mahmud glanced toward him and saw that his son was emptying the last bag of genemod grain onto the bare rock platform. The bioroid camels were already responding to the sight and to the attractor pheromones that Hassan had sprayed into the air moments before. They were ambling over to eat; soon, they could be tranquilized and herded back to the camp, where the family's robots had already finished repairing the damaged holding pens.

Hassan turned and stepped away from the scattered fodder, folding the bag to tuck it into his pack. Mahmud felt a surge of fatherly pride; Hassan was a handsome boy as well as reliable. His heavy build and thick pelt of mid-brown fur marked him as truly adapted to the family's new home. Mahmud shook his head, reflecting that Hassan's genetic modifications would make him illegal, even an abomination, in the family's old homeland. Did those conservative fools in the Caliphate not see that Allah had gifted men with intelligence for a reason?

"Hey!"

Mahmud looked up at Hassan's cry, in time to see his son diving hastily aside as one of the camels charged his back. He must have heard the creature coming at the last moment. It looked as though only the low Martian gravity had saved him from being knocked down and trampled; even an involuntary leap carried him meters aside.

Hassan rolled and scrambled to his feet, scrabbling for the tangler weapon at his belt as the camel lurched to a halt and turned. Mahmud jumped from his rock and ran toward him.

"Mahmud! Hassan!" It was Soraya on the radio. "I have analyzed those grain samples. They have been tampered with – some kind of psychoactive agent, I think."

Mahmud cursed himself silently as he ran. He was sure that his wife was correct, and now Hassan was in danger of suffering for his father's foolish feuds.

Transhuman Space: Bioroid Bazaar completed the conversion of the game-mechanical treatment of all the bioroid and parahuman types, and some of the more intelligent uplifted animals, from Third Edition **Transhuman Space** supplements to **GURPS** *Fourth Edition*. However, in creating that supplement, an additional need became clear: an in-depth treatment of the whole subject of biotechnology in Transhuman Space.

That's what you're reading now: a discussion of the history and social consequences of advanced biotech in Transhuman Space. Of course, **Bio-Tech 2100** is a supplement for a **GURPS** setting, so it also offers appropriate game mechanics where relevant, including game details for some radically nonhuman creatures produced by the biotechnology it describes.

NOMENCLATURE

In this volume, the series of supplements that defines the game world are cited as **Transhuman Space** (in bold italics). The setting itself – the solar system in the year 2100 – is referred to as Transhuman Space, without boldface or italics. However, campaigns exploring that setting are **Transhuman Space** campaigns, because they are based on those supplements.

PUBLICATION HISTORY

The historical and social background discussions in this supplement, and some of the game-mechanical details, draw on multiple previous **Transhuman Space** books, but extend and adapt those ideas. A little of this material also derives from ideas in **GURPS Bio-Tech,** but substantially adapted for this specific use. Some of the new perks are borrowed from **GURPS Power-Ups 2: Perks.**

ABOUT THE AUTHOR

Phil Masters is the **Transhuman Space** Line Editor and the author of several previous supplements for the line, including **Changing Times** and **Shell-Tech.** He is British, has been a roleplaying game writer for over 30 years, and has worked with Steve Jackson Games for over 20 years, as well as writing for Hero Games, White Wolf, Posthuman Studios, Osprey Publishing, and others. His credits also include the **Discworld Roleplaying Game,** the new edition of which should be out real soon now. His website is at **philmasters.org.uk**.

His own biomods are strictly limited to a few repair jobs.

Pushing legal and ethical limits had made the company a lot of money, so the controversial nature of uplift work actually made it *more* tempting for them. In 2033, they produced their first more-or-less sapient dog.

It was an early design, of course, with its full share of problems. The company never made more than modest profits from customers who wanted smarter pets, more versatile guard or search animals, or intimidating but fully trainable (and more disposable) troops. Still, that first "super-dog" is universally acknowledged in 2100 to be the direct predecessor of the modern K-10A.

Uplift engineering then slowed down, though the work never stopped entirely. Biotech Euphrates wasn't making much money from dogs, and better computer modeling made physical experiments in brain design look expensive and clumsy. Additionally, other species offered fewer

possibilities. Dogs are trainable and already quite smart; have breeding generations short enough to allow projects to achieve useful results in just a few years; and were already familiar in biotech laboratories. Other animals looked to be a lot more work for less profit. By the 2040s, various companies were working hard on dolphins, partly because they were naturally smart creatures with big brains, but mostly because the U.S. Navy and some of its counterparts elsewhere offered generous research budgets (and ways around annoying ethics boards) for the creation of aquatic soldiers. Even so, reliable dolphin uplift methods were only developed in the late 2050s. For the most part, animal uplifts are the product of the last couple of decades of the 21st century, when the costs of genetic engineering fell to the point that the creation of worker animals for quite specialized markets finally looked economically viable.

MENTAL SYMBIONTS

Genetic uplift is still a young technology with serious limits, even in the runaway-science world of 2100. One of the most severe is that giving a modified version of a nonsapient species a larger, more powerful, *functional* brain is *hard*. Even where designers seem to succeed, regression or other forms of instability may emerge as the uplifted creatures mature, or metabolic stresses or neurological problems with the brain's connections to the body can be catastrophic. Some designers mutter that rules preventing them from using human genetic sequences don't help, but actually, that's a small issue; it wouldn't be possible simply to give a dog or an octopus a human brain, after all.

Hence, some projects go for a quick workaround. By installing implant computers with specialist AIs in young animals, and training the creature and AI to work together, they aim to increase the creature's useful abilities by handing off a proportion of mental processes to software. War-dops (**Under Pressure,** p. 102) and rat kings (**Deep Beyond,** p. 114) demonstrate two versions of this approach.

However, AIs have problems and limitations of their own. Computers can't simply integrate with organic brains; they work in completely different ways. Hence, they have to *interface* – which is a complex problem and not something that can be part of a quick workaround. Humans mostly interface with implant computers using

language, but animals don't have human-level language centers in their brains. Less competent designers rely too much on pleasure and discomfort as response induction mechanisms, which rarely leaves the adult animal psychologically stable; a better solution seems to be to install subtle connections to the creature's sensorium and then take years to train the creature and its enhancement software to understand each other.

That in turn runs into other problems, though. Artificial intelligences built on standard architectures are mostly designed to understand *human* thought processes; they can suffer a sort of mental stress through extended attempts to deal with a nonhuman mind. Conversely, an AI that does become used to working with a boosted creature may adopt some of its priorities and cognitive modes, so that the gestalt becomes, at best, a fairly smart animal with a Web connection, rather than a sapient being. Likewise, attempts to program AIs to serve as emotionally detached "super-egos" can produce deeply confused beings which act like unthinking animals with digital observers inside their heads.

Research is ongoing, but this is *not* a mature technology in Transhuman Space. Mental symbiont characters should always be treated as unpredictable. If they are PCs, an unusually high level of mental disadvantages may be *required,* and many of those disadvantages should be the sort that other players will dislike.

BIOROID TECHNOLOGY

The creation of bioroids – artificial biological beings, at least potentially capable of full sapience – was partly an accident, arising mostly from advances in artificial organ production. Essentially, as biotechnology advanced, medical scientists determined that they could produce working facsimiles of every organ in the body, as well as "wet nanotech" systems which could replicate many metabolic functions. Further, medical scientists had gained considerable

experience in combining multiple synthetic organs, originally in order to perform repairs on the victims of especially severe accidents.

That mostly just left the brain, as artificial brains obviously weren't needed for transplants – but academics had worked on constructing organic brains from scratch, for purposes such as abortive "biocomputer" projects and as test beds for neural interface systems and other fields of research.

SPOT THE BIOROID

Most bioroids are made to look like human beings. A few, such as various "cat person" types, are aesthetically exotic in ways that would require a *lot* of cosmetic surgery for a human to match; have very visible adaptations to specific environments; or are simply made distinctive (e.g., the Rodosha, *Wings of the Rising Sun,* p. 15, and *Bioroid Bazaar,* pp. 25-26). Nonetheless, designers generally take the simple option. However, bioroids usually are immediately identified as such by anyone who meets them. How does this happen?

Firstly, many are visually standardized. All the bioroids of a given low-cost model don't usually look *identical,* but they tend to be very similar, and most humans are familiar with bioroid models that are common in their society. Still, a bioroid which is not of a deliberately nonhuman or highly standardized type, and which is not dressed distinctively, *can* pass as human on sight unless the observer makes a Per roll at -3 or a Per-based Bioengineering (Tissue Engineering) skill roll. The GM may permit a Per-based roll against some other skill instead when the skill is appropriate (Current Affairs when the bioroid model is one that's been in the news, say, or Expert Skill (Military Science) for a combat model). This roll is at +3 if the bioroid is very lightly dressed or naked; engineered musculature, nonstandard body hair patterns, and "artificial" skin textures can be very recognizable. However, a bioroid with the Passing Appearance perk (p. 19) or with the Concealed Bioroid Body meta-trait (*Changing Times,* p. 43) can never be recognized solely on sight. The GM also may permit Disguise skill (or cosmetic surgery) to produce the same result.

Second, all bioroids have VIIs, which are almost always active, and even those few who turn their implants off may have wearables. This makes them visible in local open communications networks, and their systems will usually have flags showing their status; in many societies, this is mandatory, and obfuscating tags may be illegal for bioroids. Hence, anyone with an augmented reality system can see any bioroid who is tagged as such, although the GM may require busy or distracted observers to make an IQ roll for them to be paying enough attention to their AR environment. In Fifth Wave societies where appearance and dress style can vary dramatically and whimsically, this may be the usual way that bioroids are identified.

Third, *acting* like a human is a challenge. Bioroid behavior and speech reflect their "programmed" psychology, including especially a tendency to subservience (or, in the case of some combat bioroids, calm assertiveness verging on brutality). Anyone who closely observes a bioroid who is trying to pass as human for at least a few minutes has a chance to see through the act; roll a Quick Contest between the bioroid's Acting skill and the best of the observer's Psychology (Applied/Bioroid *or* Human) or Detect Lies. If the observer wins, he notes that *something* is "off" about the bioroid's behavior; if the roll was against Psychology (Applied/Bioroid), they recognize exactly what they're dealing with. For daily, extended contact, roll the Contest again once per day, although should the observer ever roll a critical failure or the bioroid roll a critical success, the observer becomes convinced that the bioroid is human, and can't roll again.

Lastly, most bioroids will be detected as such by even a cursory examination using TL10 medical equipment. The only reliable way to defeat this is by having the Concealed Bioroid Body meta-trait.

ADVANTAGES

Biotechnology and its consequences can interact with some **GURPS** advantages in significant ways.

Empathy

see p. B51

Anyone with the Empathy advantage (or the lesser Sensitive version) can "read" most humans, parahumans, ghosts, and bioroids. However, nonsapient uplifts and some nonsapient bioroid animals (that is, any being with base species IQ 5 or less) require Animal Empathy. Whether Empathy works on AIs (including any running on bioshells) may depend on whether the GM has chosen to include "Machine Empathy" from p. 52 of *Changing Times.* See p. 17 for rules for interactions between Empathy and bioshells.

Resistant

see p. B80

Bioroid Bazaar, p. 5 and pp. 9-10 points out certain problems with the idea of human-influencing pheromones, and this makes various levels of treatment of the subject optional in *Transhuman Space* games. This has various game-level consequences.

If pheromones are in use in a campaign, a few people might possess some level of Resistant to their effects, through genetic engineering, nanomods, or just natural variations in neurochemistry. (This might also accompany the No Sense of Smell/Taste disadvantage!) "Pheromones" would usually count as a *Rare* effect, making Immunity a 5-point advantage; they might count as *Occasional* in campaigns where several different synthetic pheromones are heavily used for social manipulation. Immunity to one specific type (e.g., "Eros bioroid sex pheromones") would just be a perk.

However, the GM may rule that attempts to block pheromones have unfortunate neurological side effects. For example, a lack of response to oxytocin is linked to psychopathic behavior; someone seeking such treatments could also end up with the Low Empathy disadvantage, or the advantage could have that as a Temporary Disadvantage limitation – a person's defenses might respond to chemicals intended to make him more emotionally responsive by shutting down his social responses altogether for as long as the attack persists.

NONHUMAN BIOSAPIENTS IN 2100   **18**

One or two bioengineers in the group *may* doodle designs for a "real" Chupacabra, complete with vampiric diet and even demonic eyes, in their spare time, but the Society has generally managed to keep its members behaving vaguely responsibly. Still, if, say, an eccentric billionaire wanted a "zoo specimen," it wouldn't be hard for them to supply one. Including the legend's vicious blood-thirst would surely be *much* too unwise for anyone.

Attribute Modifiers: ST-3 [-30]; DX+1 [20]; IQ-6 [-120]; HT+2 [20].
Secondary Characteristic Modifiers: SM -1; Will+4 [20]; Per+7 [35]; Basic Speed+0.25 [5].
Advantages: Acute Taste and Smell 1 [2]; Blunt Claws [3]; Damage Resistance 1 (Flexible, -20%) [4]; Enhanced Move 1/2 (Ground) [10]; Night Vision 3 [3]; Peripheral Vision [15]; Reduced Consumption 2 (Cast-Iron Stomach, -50%) [2]; Resistant to Disease (+3) [3]; Short Spines (Back Only, -50%) [1]; Super Jump 1 [10].
Perks: Scales. [1]
Disadvantages: Appearance (Monstrous) [-20]; Bad Grip 3 [-15]; Bad Smell [-10]; Bestial [-10]; Bioroid Body [-4]; Cold-Blooded (50°F) [-5]; Dead Broke [-25]; Hidebound [-5]; Phobia (Humans) (9) [-7]; Short Arms (Two arms) [-10]; Social Stigma (Monster) [-15].
Features: Reflective Eyes; Taboo Trait (Fixed IQ).
Date: 2096.
Cost: $75,000.

Notes

The Social Stigma reflects how humans are currently likely to respond to these creatures. If their harmless diet and habits become known, they may be treated more as Valuable Property, especially if captured.

THE LOCH NESS MONSTER BIOROID

The Society for Applied Teratology aren't idiots; the fundamental problems with their Loch Ness Project reflect things that have been discussed by cryptozoologists for well over a century, and were confirmed by initial computer modeling, not actual failed creatures. The basic issues are metabolic; the loch is simply too cold for an aquatic reptile, and too small to hide a large mammal for long or to feed a colony of them. However, other practical problems are just as bad. Loch Ness and the surrounding area are *mostly* protected countryside, but there are villages, tourist facilities, a few small high-tech fish farms, and roads along the loch side – in other words, lots of people and systems that might see any creature that surfaces and record it in digital high resolution. While the Teratologists want their Nessie to be seen *sometimes,* it has to be glimpsed briefly and confusingly; if anyone starts taking the subject too seriously, even small, low-budget investigation teams will probably bring in systems that can search the loch in excruciating detail.

So plans for a warm-blooded, air-breathing creature were quickly scrapped; it would have to surface too often, and would probably end up raiding fish farms for food, while its body heat would show up on the simplest IR sensors. The eventual design was based on modified fish biology (although it has the "classic" plesiosaur shape), with gills at the base of the neck plus an auxiliary air-breathing mechanism to allow metabolic boosts when it can surface safely. (The long neck acts usefully as a snorkel.) Likewise, it is an herbivore, which forced the engineers to give it a slow baseline metabolism – but they designed its digestion to handle high-energy supplements which they supply when they can, giving it a further boost.

It has a very cautious nature, with a tendency to bury itself in the silt of the loch bed if disturbed or just when resting; since "Nessie" was released (from a rented loch-side site) in 2096, sightings have been frustratingly rare. The Society classes this as a long-term project, but the project monitors (teams of two or three specialists working in relays, sometimes on site under various covers) are concerned that the creature's health is declining; the metabolic design was always a fine balance and may be failing. They can exert minimal control over it using subsonic signals at ranges of up to a couple of miles; they have trigger signals for "come here," "flee at speed," and "hide as soon as possible." The first overrides its built-in aversion to human contact.

Some of the designers have preserved their notes regarding a possible warm-blooded "Nessie" – essentially a large, long-necked bioroid seal. It may yet be built, but it is unlikely to be released into Loch Ness. There are other, more remote lakes with monster legends after all.

"Nessie" Bioroid

ST: 15	**HP:** 15	**Speed:** 4.75
DX: 9	**Will:** 8	**Move:** 5 (Water)
IQ: 2	**Per:** 11	**Weight:** 500 lbs.
HT: 10	**FP:** 10	**SM:** +1
Dodge: 7	**Parry:** N/A	**DR:** 2

Weak Bite (9): 1d-2 crushing. Reach C-2.

Traits: Bioroid Body; Doesn't Breathe (Gills; see notes below); Ichthyoid; Long Neck (+2 yards Reach for bite); Nictitating Membrane 1; Night Vision 5; Phobia (Humans) (9); Pressure Support 1; Resistant to Disease (+3); Scales; Temperature Tolerance 2; Wild Animal.
Skills: Survival (Fresh-Water Lake)-11.
Notes: The above attributes are under typical circumstances. The creature suffers -3 DX, -1 Move, and -1 Dodge if it has been unable to breathe air for at least 10 minutes in the last hour; and gains +3 DX, +2 Move, and +1 Dodge for 1d hours after consuming dietary supplements. Note also that it will respond instinctively and automatically to specific subsonic signals.

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We wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This structure has novel features which are of considerable biological interest.

– J.D. Watson and F.H.C. Crick, "A Structure for Deoxyribose Nucleic Acid," **Nature,** *April 1953*