



Steven Spielberg launches the unfolding of a whole new communications revolution.

By Thomas Doherty

Suddenly and unaccountably confronted with the full-scale incarnation of the creatures whose study has been the obsession of his adult life, paleontologist Alan Grant (Sam Neill) gapes open-mouthed and stares wide-eyed. His knees buckle and he collapses backward in vertiginous disbelief, just short of a dead faint, and sits down on the ground, stunned beyond speech. Seated, movie audiences beholding the selfsame sight can better keep their balance, but when the denizens on screen march (not lumber) into the spectator's field of vision, our expressions are liable to mirror the good doctor's. JURASSIC PARK isn't "willing suspension of disbelief"—it's "seeing is believing."

It has become commonplace to marvel at Hollywood's effects legerdemain in the age of computer graphics and robotics, to watch in astonished delight as Stan Winston works his sorcery and the alchemists at Industrial Light and Magic cook up another potion. But the dinosaurs conjured for Matsushita-MCA's high-profile, \$60-million investment inspire a spellbound wonder akin to what audiences must have felt



Richard Attenborough as John Hammond, a visionary like Spielberg, out for the big thrill as much as the big bucks, wowing his audience with a ticket to ride.

listening to the first "talkies." The verisimilitude is documentary in detail and utterly convincing. To watch JURASSIC PARK is to witness the unfolding of a whole new communications revolution.

Of course the film's best example of seamless matching was the meeting of minds between Michael Crichton, author of the monstrously successful gene-splicing thriller, and Steven Spielberg, the designated park ranger. The screenplay by Crichton and David Koepp streamlines and softens Crichton's novel much the way the

film version of Peter Benchley's JAWS cut out extraneous ballast (the adultery subplot) and spared the likeable characters (Richard Dreyfuss's ichthyologist) from shark ingestion. Thus, the mathematician who discourses at length on chaos theory (played by the likeable Jeff Goldblum) and the bio-tech baron (played by the crusty Sir Richard Attenborough) are each spared from a nasty fate.

Malfunctioning equipment and human cupidity propel a bungy jump into Hollywood's version of the Museum of Natural History. As in JAWS,

Spielberg keeps back the main attractions (a pissed-off T. Rex and squad of vicious raptors) in order to milk the suspense. In the first big attack sequence, he ratches up the terror in textbook Hitchcock fashion—a trembling glass of water, animal roars from off-screen, and fearful looks in the shadows. Unlike JAWS, the director need not obstruct the spectator's line of sight or cut away from an obviously mechanical creation that will not bear close up and prolonged inspection. This is the revolution announced by JURASSIC PARK. Where the old creature features had to conceal their inadequacies, the new breed struts its stuff, full-on, full-view. Spectators are invited to behold the handiwork at their leisure, challenged to detect the fabrication. Get an eye-full, folks.

Though Spielberg's name is above the title, writer-director Crichton's label has, rightly, been stitched prominently on the designer genes of JURASSIC PARK. Crichton's special genius was to overcome the chronological hurdle that has tripped up generations of screenwriters face-to-face with dat ol' demon, evolution: the temporal incompatibility of dinosaurs and men. The prime



The Rex, is it live or is it CGI? Audiences can't tell the difference anymore.

SPIELBERG'S CGI LEGACY

“After the next leap forward might this cinematic milestone begin to look pallid and dated? Probably not. Like 2001, this is a film destined to escape fossilization.”

cially the sequence of a drooling T. Rex going after a dinner of toddlers under glass. However, much of the feeding is rendered by implication in classic production code style, with screams and discrete camera pull-backs (cf. the first death-by-raptor in a crate and Nedry's fatal encounter with the venom-spewing dilophosaurus). The T. Rex, with a nod of the neck to *THE GIANT BEHEMOTH*, performs the most explicit ingestion when she chomps into a sniveling lawyer and devours whole the attorney at jaw.

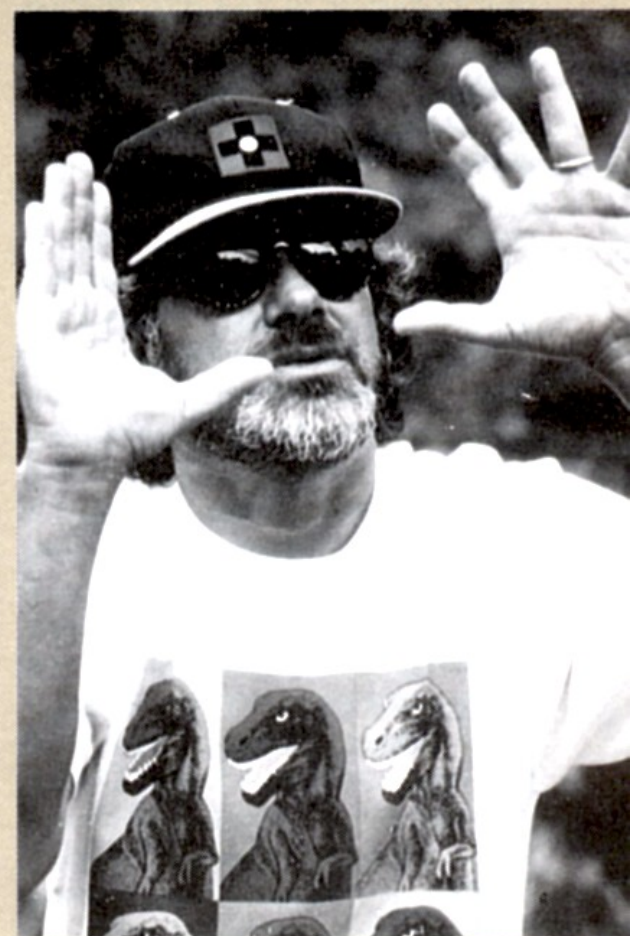
Another predictable rap on *JURASSIC PARK* is that for all its effects wonders—maybe because of them—it has no heart. Whatever the ultimate boxoffice take (the present betting is that ultimately it will settle in as the number-two grosser of all time, placing just short of *E.T.*), the film is all visceral spectacle, a magic show with nothing up its sleeve. That judgement seems unduly harsh—as always in Spielbergia, the magnetic pull of the nuclear family (Ellie's procreative urge rubbing against Grant's kid-o-phobia) anchors the effects. Still, anyone not employed by Universal would have to admit that in between the featured attractions, absent the rich characters of *JAWS* and the emotional kick of *E.T.*, a very mediocre movie may be lurking about. Films that live by effects alone, die by them, goes this line of thinking, and it will be interesting to see how *JURASSIC PARK* weathers the years. After the next leap forward in technique, might not even this level of cinematic achievement look pallid and dated?

Probably not—like 2001, *JURASSIC PARK* seems likely to escape fossilization whatever the breakthroughs ahead. And the film does have a heart, though not in the mild romantic

sparks between Grant and Ellie or in Grant's eventual acceptance of proxy paternity over Timmy and Lex. As played by Richard Attenborough (himself the maestro of epic productions such as *GANDHI* and *CHAPLIN*), John Hammond comes off as neither madman scientist nor corporate badman, but as a true visionary, a Walt Disney kind of guy out for the big thrill as much as the big bucks.

One can't help thinking of Spielberg, the man whose greatest delight is to stand at the edge of the screen and watch moviegoers responding as one to his jump-cut bushwhacks. Like Hammond, he creates his own extravagant wonderlands, populates them with fantastic creatures, promises wild adventure and spellbinding spectacle, and more often than not delivers the goods. Spielberg, the auteur of *JURASSIC PARK*, could only look with sympathy upon Hammond, the “auteur” of *JURASSIC PARK*, and moviegoers could only be thrilled with their ticket to ride. □

Spielberg directs the visceral spectacle, a magic show with nothing up its sleeve, a career pinnacle.



narrative task of the cinema *du* dinosaur—dino-kino?—is to generate a landscape where man and dinosaur could bump into each other socially. Crichton solved the problem with scientific ingenuity and novelistic originality. His brand of science fiction rejects the wild futurist scenario, the stuff of time machines, warp speeds, unlikely physics, and sketchy exposition. Instead, Crichton imaginatively expands on theoretically probable eventualities readily spied from the present. *Smithsonian* magazine recently did a piece on genetic cloning and averred that yes, Crichton's ingenious web spinning—in which dinosaur DNA is extracted from the blood of a mosquito preserved in amber—is actually within the realm of possibility. “Eureka!” Crichton must have exclaimed at his word processor—instant dino mix and in tune with new paleontological evidence (and fortuitously, with the mind-boggling advances in computer graphics and effects technology), the creatures are more bird-like, warm-blooded, fast and clever.

Alas, no cultural landmark and global phenomenon arrives without its gainsayers. The main controversy generated by the film concerned its suitability for the moppet trade and the cynicism of a PG-13 motion picture forbidding entry to children who are the prime targets of the ancillary marketing. Given the financial stakes, *JURASSIC PARK* had to come in below the R rating, smack at the center of the PG-13 zone, the category devised especially for Spielberg when *INDIANA JONES AND THE TEMPLE OF DOOM* stretched the limits of parental guidance. At the same time, the film had to pack a violent punch that would attract droves of bloodthirsty teenagers.

Although some science fiction fans might argue there's no sense having realistic dinosaurs around if you can't vividly depict their table manners with a tasty human morsel, the on-screen violence in *JURASSIC PARK* surely warrants the signpost “may be too intense for younger viewers” (or at least their concerned parents), espe-

JURASSIC PARK™

MAKING EFFECTS HISTORY

ILM's Dennis Muren, Mark A. Z. Dippe and Steve Williams on taking moviemaking to the next step.

By Ron Magid

Can a film foment a revolution? The techno-wizards of northern California's Industrial Light and Magic caused one effects apocalypse in 1977 when the company was formed by George Lucas to create effects for STAR WARS. What that film did for motion-control photography, JURASSIC PARK, Steven Spielberg's much anticipated film of Michael Crichton's cautionary tale of runaway science and genetically engineered dinosaurs, promises to do for computer-generated imagery. As the sign at ILM reading "Ye Olde Historic Motion Control Stage" indicates, the fast-approaching computer-effects age threatens to usurp even that hallmark of the ILM legacy, forever replacing the crude but wondrous techniques of the past with the sophistication and sterility of the video screen.

This breakthrough in computer technology threatens to leave a trail of fossils in its wake, including the beloved technique of stop-motion animation, and, to a lesser degree, full-scale animatronic puppetry. These suddenly outmoded techniques were once the cornerstones upon which JURASSIC PARK's effects were based. Originally, Spielberg hired Stan Winston to fabricate full-sized animatronic dinosaurs to use in principal photography, while stop-motion effects giant Phil Tippett was to handle the Go-Motion puppetry of miniature rubber dinosaurs articulated via traditional ball and socket armatures. Industrial Light and Magic was to add motion blur to Tippett's creatures' movements.

"I wasn't terribly thrilled about that idea," admitted ILM's Dennis Muren, who, along with Mark A.Z. Dippe, served as JURASSIC PARK's visual effects supervisor. "It seemed like a lot of work for



ILM effects supervisor Dennis Muren (left) and his CGI team (clockwise) Mark A.Z. Dippe, Eric Armstrong and Steve Williams, taming the computer beast.

something that always was going to fall short."

When forces within ILM lobbied to use computer-generated imagery instead of Tippett's puppet animation, ironically it was Muren, the man who supervised the breakthrough computer effects for James Cameron's THE ABYSS and TERMINATOR 2, who remained skeptical about using CG to create living, breathing dinosaurs. After all, a CG water tentacle or chrome man were both very different than the flesh and blood behemoths called for in JURASSIC PARK.

"We backed into it slowly because there was already a whole approach being taken with full-sized and Go-Motion dinosaurs," recalled Muren, ILM's towering white-haired senior mad scientist. "We needed to deliver our shots on time, and we didn't know how real we could make them using CG. I'd never seen the problems solved with the blends and the geometry where shoulders or elbows joined seamlessly. That stuff's incredibly

serious; you can't have that in a major movie, even though some CG people might say it's okay. We're not making CG here. The point is not to push the technology, the point is to make a movie. That's why I took this thing really slow, and I set the challenge: 'You've got to prove we can pull this off before I go to Steven.' From then on, I'd see tests and point out problems we still needed to solve. There were a lot at every stop."

Co-visual effects supervisor Mark A. Z. Dippe, one of ILM's next generation of up-and-comers, eagerly picked up Muren's gauntlet. "I was a total believer," the youthful Dippe said vehemently. "My attitude was, 'Let's take some risks and make some new types of images.' I felt with computer animation we'd have so much more freedom than with puppet animation. Stop- or Go-Motion puppets have very restricted movements because the puppets have to be supported by a physical rig. It's almost impossible to get your dinosaur to fall down and roll over

because you can't get the rig to do that very easily. In the computer world, we have total freedom of movement, and we can simulate all the attributes of a living dinosaur, like muscle and bone and skin and sweat and blood, which we can't do very well with a latex creature. I felt that by using CG, we could make our dinosaurs run and jump and fight and we could have herds of them! But there was still a lot of doubt on Dennis' part."

And so in December, 1991, Dippe enlisted the aid of his friend Steve Williams, and they set out to prove that CG was the best way to bring JURASSIC PARK's dinosaurs to the screen. Williams, who seems more at home on a Harley than behind a computer, was a graduate of Sheridan College, Disney's east coast training school. Though his background was primarily in cel animation, he intuitively grasped that the two-dimensional world of cartoons and the three-dimensional realm of the computer were oddly similar.

"If it doesn't work in 2-D, it won't work in 3-D," he grinned. "Dennis knew that Phil Tippett's shop was on this JURASSIC PARK project, but he also knew that if he let this little wild pack of dogs, namely me and Mark Dippe, loose on this CG problem, we'd solve it. I figured the easiest thing to do was to make a Tyrannosaurus Rex skeleton and animate it, so I had my brother-in-law send me down the complete schematics of a T-Rex, one of the 18-foot jobbies, from the Tyrell museum in the Badlands. I just scanned that in and began building bones in the computer, using the Alias modeling system, until I put together a Rex. Then lead computer graphics supervisor Stefen Fangmeier did a rendering of it on a rotating table using the RenderMan program so we could all look at it. It looked



ILM's ferocious CGI T-Rex. In the realm of the computer there is little distinction between the live-action background plate of the actors and the computer-generated dinosaurs. Getting another take is almost as easy as asking the dinosaur to back up and do it all again.

like a real T-Rex skeleton with shadows and the correct fluting on the skull and so on. Then I used Softimage and did a walk cycle on it and everyone freaked out."

After producers Kathleen Kennedy and Frank Marshall saw Williams' test, they agreed it was time to show the results to Spielberg, then offered to give ILM's guerrilla unit some additional funds to test for a herd of Gallimimus as well as build a convincing skin on top of the bones. By this time six people were working on it. Dippe and Williams took Stan Winston's one-fifth-scale Tyrannosaurus Rex maquette (which, ironically, was slated to become the Go-Motion animation puppet) to Cyberware, where the sculpture was sliced into cross-sections and scanned onto a computer disc. "I took the data back to ILM, where I remade it and fit it together so we could use it," Williams recalled. "It was inefficient for me to take the direct data and try to build a Rex in the computer; but I could use Winston's model as a template to make what was essentially a digital wireframe puppet of a T-Rex."

The digital T-Rex looked like a cross between a sculptor's armature and a topiary animal, using vertical and horizontal loops to create a rough three-dimensional puppet or "wireframe." "Stan Winston's T-Rex sculpture was beautifully done but static," observed effects supervisor Dippe. "It gave us what we called our 'Null Position.'"

Once the wireframe puppet had been made whole, it was time to complete this topiary creature's transformation into a living dinosaur by covering it with a tex-

ture map skin. For JURASSIC PARK, ILM developed a much simpler, more effective technique to skin a wireframe dinosaur: a system called 3-D Paint, which Williams and Fangmeier used to dress their T-Rex.

"Normally, we create a texture map by painting on a flat surface in the computer, and then the computer wraps that texture around our wireframe creature," Williams explained. "It's like working on a bearskin rug which the program then wraps around a wireframe bear. With 3-D Paint, we could look at our dinosaur from any point of view and then paint directly on its texture map skin after it was wrapped around the creature. That way we could do our final retouching directly on our 3-D creature from the p. o. v. of the camera in any given shot."

But the T-Rex needed an additional layer of detailing not found in most CG creations: wrinkles. While some of the major folds

were built into the actual wireframe geometry, a myriad of smaller wrinkles, which had to ripple with each movement, were added by using a new technique called enveloping. "It's essentially the same bearskin rug," Williams said, "only covered with lines and wrinkles. Wherever a black line fell on the surface of the creature, the skin indented, and wherever a white line fell, it made a crest, which gave us the correct elephant-like skin for the Rex."

The animators also wanted the T-Rex's loose skin to jiggle the way an elephant's does when it moves. "We wanted to take the skin to a new level of believability," Williams said, "so we covered it with a bunch of invisible points and cross-sections, and we actually inserted little spheres under the skin that shook and shimmered whenever the dinosaur took a step. Each point, cross-section and sphere had a name and address so a sphere in quadrant five on the leg

muscle knows to talk to point #18 on the skin over the T-Rex's kneecap. That way, when the sphere on the leg shimmered at every step, the skin over the kneecap oscillated just a little as well."

After Spielberg witnessed Williams' and Fangmeier's skinned T-Rex test, the director was determined to have ILM do not only the herd shots, but all the dinosaur effects that were originally to have used Tippett's Go-Motion technique. Not only was ILM's CG work visually astounding, it was actually more cost effective. Tippett would remain on the project as animation director, and his facility, The Tippett Company, would interface with ILM through a system Muren and Tippett had conceived called "DID," or Digital Interface Device, which utilized an actual stop-motion armature linked to a computer. Using this mechanism, it was hoped Tippett and company could animate their wireframe T-Rex shots and then pass them back to ILM where skin and texture maps would be added before they composited the creature into the background plate.

For his efforts, Williams was awarded the position of senior animator on JURASSIC PARK, although ultimately six ILM animators and two Tippett animators shared equal credit. Visual effects supervisors Dennis Muren and Mark Dippe rapidly assembled a team of CG animators of varied backgrounds. Using Stan Winston's maquettes of his full scale creatures and other dinosaurs that would only appear in the film via computer animation, the ILM team soon had a miniature Brachiosaurus, Velociraptor and Gal-

ILM's grazing CGI Brachiosaurs, composited via computer with the live action.





IS IT LIVE, OR CGI?

“Stan Winston and his crew deserve a lot of credit for designing the animals,” said ILM’s Dippe, “but we did a tremendous amount of work to bring them to life.”

ILM’s CGI Velociraptors on the rampage. Noted Muren, “When you see shots that are no-holds-barred, creatures right there in your face—those’re ours.”

limimus, among others, scanned into their computers to work with in the digital realm. Muren had worked with Winston before on *TERMINATOR 2*, and found the experiences comparable: “Our work had to follow Stan’s because his stuff was needed on set while our work began after production ended. Working in post-production, it was really important to focus on the shots we had to make, not on the whole deal. We delayed as much as possible on each sequence, hoping to get the final cut so that all our time and money could go into those shots that were definitely in the sequence.”

ILM’s CG dinosaurs not only had to be well rendered, they had to match Winston’s full-scale creatures exactly, wrinkle for wrinkle, bump for bump. “Because of all the bumps and folds of skin, it had to be a dead match,” Muren shook his head, “and that’s hardly ever been done. Phil Tippett had input on the coloring and the final finish on all of them. We couldn’t do our usual procedural ways for generating random surface detail because these things had to be very specific so they cut.”

More importantly, they had to move believably, which meant that Muren, Dippe and their team had to become dinosaur psychologists. “Stan Winston and his crew deserve a tremendous amount of credit for designing the animals,” Dippe said, “but we did a tremendous amount of work to bring them to life, and the way we did it was very sophisticated. Animation is where everything can fall apart; the creatures can easily look stiff and not move as if they have a center of gravity. To counter that, we had a local performance artist, Leonard Pitt, come here and give us classes every week in performance, dance, movement, even

mask work, just to get into the whole idea of how these creatures moved. We tried to find the tempo of their movements, see how they shifted their body weight, and played with things that were more serpentine like moving their tails. We went out and took footage of elephants and rhinos at Africa USA, and applied those movements to our CG dinosaurs. We also studied footage of Komodo dragons, which move very straight and stiff and whose bodies are tight, as well as ostriches, because some dinosaurs’ movements were very birdlike. We became quasi-dinosaur experts, and then we took our theories to three paleontologists. They criticized us conceptually until we showed them our animation—then all three of them said, ‘You know something? That looks so great, we may be wrong!’”

The biggest debate centered on how fast the Tyrannosaurus Rex would run in “the jeep chase” sequence, which, not surprisingly, was the first major T-Rex sequence animated by ILM for the film, and which incorporated some of the original test footage. “That was the most demanding T-Rex sequence,” claimed Dippe, who supervised it. “The T-Rex runs after the jeep, crashes through a huge log blocking its path and does other things that a six-ton animal would have a

hard time doing, but we had to make it believable. The jeep was moving at 20 mph and the T-Rex had to catch up to it. What was fun about it was we’d totally created this creature and now we had to think like we were it. What’s its motivation? I want to kill that motherfucker, I’m mean, I stink, my breath is really bad, I weigh six tons and I run 20 mph, but I run on two legs and I take three steps to stop and if I fall down, I’m going to break my neck!”

Steve Williams, the primary animator on this sequence, was now faced with the unenviable task of determining not only how a T-Rex ran, but how fast. “We had a zillion arguments about it,” he laughed. “Some people argued that it was probably like a lion: it never ran unless it had to, and if it ran, it would do so for a short period of time and move very fast. Using that logic, I had to throw physics out the window and create a Rex that moved at 60 mph even though its hollow bones probably would have broken if he ran that fast. There was also the school of thought that the thing was so big and muscular it didn’t matter whether it ran or not. Either way, there was no real reference for a seven-ton bipedal animal running around, so we had to try to invent a dinosaur and try to make it look believable.”

“Phil Tippett and I debated about just how fast or slow the T-Rex should move,” said Dippe. We wanted the dynamism and excitement and terror of the shot, which was related to speed, but we found ourselves fighting two things: if the T-Rex moved too fast, he started feeling light and

small, while if it moved really slow and the ground shook with every step, it felt heavy and gigantic but ponderous.”

In order to give the behemoth the feeling of size and power, yet still make it capable of catching the speeding jeep, Dippe and Williams cheated the speed of its movements: “I tried something wacky,” said Dippe. “I slowed him way down and made him move like he was so damn huge and fat, but we made his footsteps really far apart. Now he could take a 20-foot step, but that created other problems. In order to take such long steps, he had to crouch down, but we wanted him to look as big as possible in the frame. If he got too low, it started to cram him down, and if he got too high it didn’t make sense for him to be taking such big steps! It took us weeks to figure this stuff out, not to mention the motion of his tail, but when we were done, all of a sudden, the shot worked. We showed our experiment to Spielberg and he said, ‘That’s it! That’s it!’”

That settled, now the dinosaur had to be married to the background, a difficult proposition considering the plate had been shot from the back of a moving truck! “That was a very ambitious background plate,” Dippe smiled. “We wanted to create a shot that felt like you’re riding in the jeep and the camera’s looking over your shoulder as you’re thinking, ‘Shit, look at that animal!’ We couldn’t use the Tondreau motion-control system in this case because it only works when the axes of movement are precisely known, meaning

ILM’s gaggle of galloping Gallimimuses. This frame sequence shows how the CGI image of ILM’s computer animation has the same blurred reality of the shot’s live-action background plate, complete with ambitious freehand camera moves.



we'd have to have used dolly tracks and special tilt-pan heads so the computer could record the camera's positions. We didn't want to shoot a static plate motion control and then do some silly thing like add shake to it, but we wanted to get the feeling of a jeep really driving down the road.

"In the old days, we worried a lot about having steady cameras when we wanted to put an animated object into the frame; that object had to move with every jiggle in the background plate or it would look fake," Dippe added. "But because we were using CG effects and digital compositing, I felt we should shoot the jeep with some sort of in-frame reference to serve as guidelines for plotting the movement of each frame. In this case, we carefully placed little glowsticks on the ground at precise increments, like landing lights, at our location. Once the background plate was scanned in, we matched the movement of our two cameras by building a virtual set in the computer that duplicated the background plate, including the glowsticks. We then took one frame of the real picture and put it up on the screen and moved the computer camera around until the computer glowsticks lined up with the real ones. We did that for every eighth frame, then we went in and matched frames as needed until the computer camera moved in sync with the real camera."

It took almost three weeks to match the computer camera's movements to those of the real camera for the jeep chase sequence, but the shots rank among the most ambitious freehand camera moves ILM has ever tackled. The result is as seamless as a shot of a charging rhino chasing a team of photographers in a nature documentary. In the realm of the computer, the distinction between reality (the background plate) and effects (computer animation) becomes quite blurred. "In reality, you have a real camera, a real set and real actors," Dippe explained. "In the computer, we have a com-



ILM's CGI T-Rex in Spielberg's staggering jeep chase, the first major sequence animated for the film, incorporating some of the test footage that sold Spielberg on using CGI. The background plate was shot on the back of a moving truck.

puter camera, a virtual set and digital actors. Once the background plate is scanned into the computer, the computer camera becomes the same as the real camera, the virtual set becomes the same as the real set, and the real actors and our digital actors interact. We place our lights in the virtual set in the same place as the real lights are, shining in the same direction and the same color. It's funny, it's really a physical thing. We're directing a world of living creatures and physical objects that exist on our screen."

And getting another take is almost as simple as asking your dinosaur actor to back out of the shot and try it again. "That's the way I think about it," Dippe said, "but it actually takes overnight to compute. We set it all up on our virtual set, position our lights and then say, 'Okay, dinosaur, move a little faster now, crouch down a little lower and open your mouth four frames earlier!' I really just think that way, but then we have to go in with our mouse and select that stuff and run it, which usually takes at least an hour or two. On the other hand, if these were stop motion shots, we'd have to redo

the whole shot from the start, one frame at a time, and that could take days or weeks."

Once an image is in the digital realm, adding effects is akin to working with film on the atomic level, altering pixels, the essence of film, to create perfect images. In the computer, adding a dinosaur to a background plate means transmuting the pixels that once contained background information into dinosaur pixels; the process is seamless and undetectable. "In the old days when we did optical printing," Dippe recalled, "if we wanted to put 40 spaceships together to make a dogfight, we'd have to expose spaceship #1 on the negative, then add spaceship #2 to the same negative, and so on. That negative had to run through the optical printer 40 times, and if we screwed up anywhere in the process, we'd have to start from zero. That was part of the magic of the old ILM. On some of the STAR WARS films, they did composites of upwards of 40 elements, which in the optical printing world is almost mystical. Digitally, if we got the first 20 layers right but screwed up #21, we'd just redo the

21st layer and continue on. It's a totally transparent process."

The jeep chase sequence was a textbook of layered levels of CG animation. "After we added the primary dinosaur animation to the plate," Dippe said, "we layered in the debris and dirt kicked up by his feet, and some CG branches that were flying and debris explosions after he busts through the log. We also removed some flares caused by light shining through the trees. This was all done totally digitally before we went out to film again, and for any given situation, we could go back in and change one frame and the rest would stay intact, which is another advantage over optical printing. We shoot film, scan it into the computer, take out what shouldn't be there, add what's missing, then film it out."

One of the more demanding sequences was the Gallimimus chase, wherein Dr. Grant and two children flee a stampeding herd of ostrich-like dinosaurs, which eventually catch up to, run around and pass our heroes. As in the jeep chase, several plates contained ambitious freehand camera moves. "Photographically and directorially, shots like these create the feeling that you're actually there," Muren crowed. "For the Gallimimus chase, we had Steadicam shots running along with the actors as the Gallimimus were passing them, just the way you'd really shoot it if it were happening for real."

While Steve Price animated the shot of the T-Rex, the task of animating the herd fell to Eric Armstrong and Don Waller. Waller's background had been in the field of stop-motion animation, where he was considered one of its young

With up to 24 dinosaurs in any one shot, the stampede was one of the most ambitious computer animation scenes ever attempted. As a guide, the computer displayed the background plate in side, front and overhead perspectives.





The stampeding Galimimuses were animated by Eric Armstrong and Don Waller, a stop-motion expert who had to master the computer in a hectic two months.

rising stars. For JURASSIC PARK, he had to master the computer in a hectic two-month period prior to beginning to animate on the film. "It was like learning a new language," he observed. "Overcoming the x-y-z plane while looking at a two-dimensional monitor and getting used to doing animation with a mouse instead of reaching in and grabbing a puppet were the biggest challenges I faced."

Waller was surprised to discover that the processes of stop-motion and computer animation were more alike than he thought. "The major differences between the two are that in CG, no individual animates the puppet, and, in my case, I was able to animate using extreme frames and let the computer add the in-betweens. I still had to tweak the action to get the dinosaurs to move properly, but the computer would in-between it for me about 50% of the way."

Waller's cel animation background helped him in terms of creating movement "cycles" for the Galimimus. "It took Eric Armstrong and I about two weeks to figure out and animate our own versions of run cycles for the Galimimus," Waller recalled. "That way we had two different runs plus we could further tweak them to make them look individual. We freeze-framed some ostrich footage on a videotape monitor, and then I put cels up on the monitor and traced the run cycle patterns of the ostriches a frame at a time to get an idea of how their legs moved. We also watched the stampede of the veldt animals in KING SOLOMON'S MINES because Spielberg kept referring to it, and we studied big herds of gazelles to see the way they turned. Phil Tippett also made comments about how these things should move."

With 24 Galis in any given shot, the stampede was fast be-

coming one of the more ambitious computer-animation sequences ever attempted. "The hardest thing to do in these shots was to make the Galis look like they were actually running around the actors," Waller said. Waller and Armstrong's task was aided by the computer itself, which allowed them to view the digital set from side, front and overhead perspectives, and by fellow animator Joe Pasquale. "Joe made little floating CG balloon heads that followed each of the actors as they were running along the path. He also made a computer grid that blocked the landscape into five-foot increments like a football field, which helped us decide where in space to place our Galis."

Positioning the Galis in the shot was accomplished using 'hood ornament forms,' which almost looked like giant wooden chess pieces, created by Eric Armstrong. "We first arranged our hood ornaments aesthetically from the angle that the background plate was actually shot, then we went to the other angles to make sure the dinosaurs weren't in danger of passing through one another into the fourth dimension!" Waller grinned. "We had to make sure the Galis were spaced so there appeared to be a lot of them coming over the hill, and when they did get close to each other, we had to make sure they didn't bunch up unnaturally and that they reacted as if they might collide with one another. Once we tweaked their paths, we went in and tweaked the animation of each Gali. Because the run cycles were already figured out, we were able to fully animate about three Galis a day in any given shot. At that rate, it took about a week and a half to get a finished shot. There were nine cuts in the sequence altogether."

One of the great attributes of CG praised by effects gurus is its

EFFECTS VERISIMILITUDE

"Photographically and directorially, these shots create the feeling that you're actually there," said Muren. "We used Steadicam shots the way you'd shoot it for real."

flexibility, a quality put to the test by a near-last minute decision from Steven Spielberg to add a sequence to his film not in Crichton's original novel. Though no self-respecting dinosaur movie would be complete without one giant behemoth battling another, sad to say that's exactly the case in the book, a deficiency which Spielberg decided to address well into production. "Steven came up with the idea of a fight between the Tyrannosaurus and a couple of Velociraptors about a month or so before he wanted to shoot it," recalled Dennis Muren, who supervised the sequence. "He gave us storyboards on it, but it was unclear as to what the fight was going to be, although we knew it had to end with one of the Raptors being tossed into the T-Rex skeleton in the Visitors Center."

"Once we got on that set, Phil Tippett and I got more specific with Steven on each of the shots to get the overall blocking of the action and performances right," he remembered. "We had to previsualize the entire sequence, set it up and shoot it. For the final two shots, we decided that the T-Rex would lower its head with the Raptor on its back, whip its head around, grab the Raptor's tail in its mouth, then swing it around and fling it across the room into the dinosaur skeleton. We walked through the action and he set the cameras so the fight would be the most dynamic. We probably didn't spend anymore than half an hour

figuring out the camera angles and movement. Phil had a big cutout of the T-Rex's head on a stick. We timed it, put two cameras on that shot, one locked off, the other moving, and ended up using them both. We rehearsed a dry run two or three times and then at the end of the actual shot, Michael Lantieri, who handled the floor effects, blew the T-Rex skeleton up. We got it in one take."

Of course the background plate for that scene just shows a Tyrannosaurus skeleton crashing to the ground. Animator Steve Price added the missing Velociraptor careening into the bones at precisely the right moment, as well as the enraged Tyrannosaurus. "That was just a matter of knowing we had to get from here to there," Muren said of the Raptor toss, "but that's nothing compared to trying to make these things look like living, moving creatures. In this final sequence, we have a CG Tyrannosaurus coming down within four feet of the camera lens, shaking the Raptor in his mouth, then tossing him 25 feet in the air. That was done all in one shot with the camera panning around! That's what I was going for on JURASSIC PARK: when you see shots that have no holds barred, where these creatures aren't hiding behind something, but are right there in your face—those're ours."

But Muren, who has labored in the field of computer-generated effects longer than just about any-

continued on page 60

Trailing ILM's CGI Brachiosaur. Computer graphics provided for a textured, wrinkled skin that shook and shimmered with each step like that of a real animal.



World Media

HOME VIDEO ENTERTAINMENT

Your best source for...

- Classic Movies
- Current Releases
- Obscure Releases
- Classic Film Series
- Classic TV

OCTOBER SPECIALS

Titles below are 10% off

- Clash of the Titans \$17.98
- Conan the Barbarian \$13.45
- Excalibur \$17.98
- Golden Voyage of Sinbad \$13.45
- Sinbad and the Eye of the Tiger \$13.45
- The Blob (1988) \$13.45
- The Fog \$13.45
- The Legend of Hell House \$17.98
- The Monster of Piedras Blancas \$13.45
- Phantasm 2 \$13.45
- The Reanimator \$17.98
- The Stuff \$13.45
- The Thing (1982) \$17.98
- The Fly (1986) \$17.98
- Invasion of the Body Snatchers (1978) \$17.98
- Omega Man \$17.98
- Predator \$13.45
- Tron \$17.98
- Leviathan \$17.98
- Robocop \$17.98
- Dragonslayer \$13.45
- Brazil \$17.98
- Crimewave \$17.98
- Innerspace \$17.98
- UHF (Weird Al Yankovic) \$17.98

For VISA/MC Orders Call:

1-800-859-8688

or send check or money order (no cash please) to:

World Media

P.O. Box 2086
Rialto, CA 92377

CA residents add 7.75% sales tax
shipping & handling add \$3.50 to
entire order

Your satisfaction
is fully guaranteed,
or your money back

Send \$2.00 for
complete catalog

ENGLUND'S NIGHTMARES

continued from page 51

Freddy done and what is he to the people who made the movies? It deals with the question of creating a horror icon and then releasing him into the cinematic world where he's absorbed into the real world's pop culture. Is the world a better place after his arrival? How does he affect our real lives as opposed to our screen personae? All exciting, different and unique stuff. I can't wait to start working on it. And 7 is Wes' lucky number."

But how does all this fit in with the ending of JASON GOES TO HELL: THE FINAL FRIDAY, where Freddy's gloved hand grabs Jason's hockey mask climax? "Oh, NIGHTMARE 8 will be the Freddy versus Jason idea," Englund remarked casually. "What's old is new again. My excitement over Wes Craven's NEW NIGHTMARE ON ELM STREET is that the powers that be have finally realized it was a classic series which offered great opportunities to comment on contemporary culture. We were so eager to wrap up the story in FREDDY'S DEAD, we didn't do it properly. Now we probably have our best chance to do so."

And after reprising his most famous role, Englund may step into the shoes of two other classic monsters. "There's talk of me starring in the remake of Fritz Lang's M to be shot in Budapest. Strangely enough, it's the part I feel Freddy most owes a debt to. Then there's THE HUNCHBACK OF NOTRE DAME which, aside from his deformity, harks back to the sympathetic parts I used to play pre-Freddy. I've been wondering when the major studios would apply all the new special effects technology to the classic horror monsters. Perhaps this will start the trend."

TIM BURTON

continued from page 34

whose good intentions are misperceived by those around him. "I grew up with those pictures," remembered Burton, "so I feel close to them. In PLAN 9 FROM OUTER SPACE [much of which takes a place in a graveyard] there are references to Burbank, and I lived near a cemetery when I was growing up, so I thought they were talking about the [Burbank] cemetery."

Quoting a line from the ED WOOD script, Burton laughed and said, "It's a movie that will entertain millions."

FUTURISTIC CARS

continued from page 27

off that this is how he regards it,

and only small consolation in the fact that however well he does, not even he could afford it.

"The back of the car is completely modular," recounted a beaming Silver to his visitors. "You go to the dealership and they literally snap out your entire back, which is your engine. And you know what? This car has traveled more than we have."

SCI-FI COSTUMES

continued from page 31

police uniform four or five times."

After EXCALIBUR premiered, a number of fashion designers—particularly some in Japan—began to incorporate medieval armor motifs in their designs. Alas, Ringwood said it is impossible to tell whether his fashions in DEMOLITION MAN will make themselves felt in today's fashion world, or even in Japan.

"I don't think it's like the old days when Adrian invents shoulders, and the next year everyone is wearing shoulders. The fashion world is too diverse and there's no mainstream line. Everyone's doing their own thing."

ACTION STARS

continued from page 25

before," said the star. "It's a story of conflict, a story about Good and Evil. Not only are me and Wesley good and evil, but the town itself, the city, the world: on top, everything looks good; underneath, everything's rotten. It starts out as just me and Wesley trying to fight each other, but I find out there's a lot more going on here: society is not what it seems to be; this future is not so pure; and the bad guys are not so bad. So there's a statement made about how we all have to co-exist, and there's no one way—there's many ways that have to mesh together. Like I say at the end of the film, you people down here have to get a little clean, and you clean people have to get a little dirty, and somewhere in the middle we'll find the truth!"

Snipes, on the other hand, sees the science fiction as pure escapism. "I don't think this needs to have a message," he stated. "Sometimes, things are pure entertainment, and I think this is maybe one of those films. If people chose to find a message in it hey, different strokes for different folks! I just want to have a good time—bring somebody and say, 'Hey, if you want to have a good time, come and see this film!'"

DEMO WRITER

continued from page 18

Oh, and Lenkov received \$60,000, the prospect of a \$160,000 bonus, and some rewrite work,

leading a letter writer in a subsequent issue of *Premiere* to observe that, in typical Hollywood fashion, the fellow who did the most work made the least money.

Is Lenkov pissed? You bet! But having moved on to better things—Lenkov has also penned a sequel to Sam Raimi's DARK-MAN—this Montrealese can also afford to be reflective.

"I was naive," he said in what by now has become one of the oldest songs in this town. "I didn't understand how the business works. I come from a trusting background. I trust people—I still do. The mistake I made was getting involved with the wrong people. Fortunately, I then got involved with the right people—Warner Bros and Joel Silver. And that's it. Chalk it up to a learning experience."

MUTANT ACTION

continued from page 49

Naschy/Jacinto Molina, writer, director and star of numerous horrors including the Walde-mar Daninsky werewolf series, THE HUNCHBACK OF THE MORGUE and DRACULA'S VIRGIN LOVERS. Recalled Iglesia, "Naschy agreed to play a cameo but had to have urgent open heart surgery when we came to shoot the scene. While I see ACCION MUTANTE as exploring new territory in Spanish horror, I'd be proud if critics said I was following in Naschy and Franco's footsteps."

JURASSIC CGI

continued from page 58

one, knows all too well how quickly such cutting-edge imagery becomes passe: "I'm not sure how this stuff is going to age, because we're starting out with something that's so strong. Maybe we'll look back in ten years and notice we left things out that we didn't know needed to be there until we develop the next version of this technology. One thing's for sure: we haven't seen the end of this. When I set up T-2, I said, 'I haven't found the wall yet' and I still haven't. There may not be one."

Like the scientists in Jurassic Park, the brains at ILM have taken their science to a level even they can't quite conceive of. This next evolutionary plane promises incredible new vistas which will all reside in the realm of the computer. But in planting this seed, ILM may well sow the roots of its own obsolescence. Eventually the wizardry of JURASSIC PARK will be available to everyone with a personal computer. Of course, developing the talent to use it imaginatively is another matter.