1998 Western Invitational Tournament VI - The Buzz-erkeley Bowl Tossups by Caltech (R. Mason, C. Nolte, M. Swiatek)

1. He was given three legions, far larger than any Roman force employed in Judaea before, to crush a Jewish revolt in 67 AD. He was trusted with so much power because his humble origins made it inconceivable that he would challenge the emperor Nero. But, after the deaths of Nero and Galba plunged Italy into civil war, who --for 10 points-- was acclaimed emperor by the eastern legions in July of 69 and subsequently founded the Flavian dynasty?

Answer: Vespasian

2. After the 'Games of the Rival Tribes,' the 'oldest-wisest' villagers begin the 'Adoration of the Earth,' and the Sage kisses the hill which has begun to flower. In Part Two, the hill is the site of 'The Chosen One's Dance of Death,' which she performs clad in bearskin as the elders dedicate her sacrifice to the god Yarillo. For 10 points--name this work whose May 1913 Paris premiere resulted in riots over Nijinsky's daring choreography and Stravinsky's music.

Answer: The Rite of Spring or Le Sacre du Printemps

3. Maybe the Swedish Academy should consider revoking the Prize it gave to Robert Merton and Myron Scholes in 1997. The two economics Nobel laureates supposedly put their theories into practice with a firm also led by John Meriwether and former Federal Reserve Vice Chairman David Mullins. For 10 points--what ironically named hedge fund received a financial bail-out in September 1997 after losing everything?

Answer: Long Term Capital Management

4. Modern micromechanical varieties use a tiny vibrating silicon beam or diaphragm. The ring-laser variety has no moving parts. Increasingly, "strapdown" types are used which are not gimballed and use software to compensate for the fact that they are not in an inertial reference frame. For 10 points--the conventional type of what sort of sensor to detect angular position or motion is a spinning top?

Answer: gyro or gyroscope

5. He first achieved fame in Britain playing Frank Spencer, an incompetent Gomer-Pyle-like boob, in the 1973 sitcom Some Mothers Do 'Ave Em. No one then really thought of him as a singer, although he had played Hero in A Funny Thing Happened on the Way to the Forum and Cornelius Hackl in Hello, Dolly! For 10 points--who achieved a more lasting fame as the first actor to play the title role in Andrew Lloyd Webber's Phantom of the Opera?

Answer: Michael Crawford

6. It is third behind New Guinea and the Caucusus in linguistic diversity. Of North America's roughly 250 Native American languages, about 25% are spoken in this state, though many of them are in danger of becoming extinct. For 10 points--name this state, home of the Costanoan, Pomo, Miwok, Chumash, Mono, and Mohave tribes.

Answer: California

7. He rushes at the smoke when we let drive, and before we know, he's hacking at our head; he's all hot sand and ginger when alive, and he's generally shamming when he's dead. Kipling called him a poor benighted heathen, but a first-class fighting man, and the only thing that doesn't give a damn for a Regiment of British Infantry! For 10 points—give the slang term for the ferocious Sudanese soldiers of the 1880s, a name derived from their unusual hairstyles.

Answer: Fuzzy Wuzzy

8. Letters from the New Hampshire governor to "Acting Governor King," implicitly legitimizing the "People's Governor" of the constitutional faction, were returned unopened. President Tyler refused to intervene in the conflict, and after the rebels were prevented from seizing the state arsenal in Providence, the movement was quashed. For 10 points--identify this 1842 rebellion which tried to win universal suffrage for adult white males in Rhode Island.

Answer: <u>Dorr</u> Rebellion (accept Thomas Wilson <u>Dorr</u> on interrupt)

9. He showed little excitement when told he had won the Nobel Prize for Chemistry, saying "I figured they had to give it to me eventually," and later boasting that he already had groupies before becoming a Nobelist. For 10 points--what biochemist known for his LSD use and his testimony in the O.J. Simpson trial invented the PCR technique for rapidly copying DNA?

Answer: Kary Banks Mullis

10. Through his first wife, painter Joan Mitchell, he met Ayn Rand, and wrote an essay in defense of the gold standard in Rand's 1967 collection *Capitalism: The Unknown Ideal*. He ran an economic consulting company with bond trader William Townsend, was a Director of Policy Research for Nixon, and Chairman of the CEA under Ford, before entering his current job just two months before the stock market crashed in October 1987. For 10 points--who is the chairman of the Federal Reserve Board?

Answer: Alan Greenspan

11. Rembrandt's 1635 painting of this individual shows him as a toddler, urinating in fear as an eagle carries him off into the heavens. The word "catamite" comes from the popular Latin form of his name, since he was considered the object of homosexual lust. For 10 points--identify this kidnapped Trojan prince, the namesake of the largest moon of Jupiter.

Answer: Ganymede (prompt on "Catamitus")

12. Upset by Brazil's intervention in a civil war in Uruguay, Paraguayan dictator Francisco Solano Lopez ordered the capture of a Brazilian warship, sent armies to invade the Mato Grosso, and, for good measure, declared war on Argentina. Brazil, Argentina, and a Uruguayan puppet government then signed in 1864--for 10 points--what treaty against Paraguay, also the name of the ensuing war, which was the bloodiest in Latin American history?

Answer: Treaty (War) of the Triple Alliance

13. During World War II the crests and swords of Emperor Hirohito and King Victor Emmanuel III were removed from this group's chapel. After World War II, Winston Churchill refused for eight years to join this group, whose motto is "Honi soit qui mal y pense" or "evil to him who evil thinks." Today there are many extraneous members, but the core membership consists of twenty-five men, not women, plus the British sovereign and the Prince of Wales. For 10 points--identify this club founded by Edward III.

Answer: The Most Noble Order of the Garter

14. On Christmas morning, 1933, the FBI informed Franklin Roosevelt that this couple had died long ago, leading the Secret Service to arrest impostors Ralph and Shirley Mudge. Although the Mudges were the only applicants to produce not only a birth certificate but half of a certain silver locket, they were really Lily and Rooster Hannigan, and not--for 10 points--what elusive couple for which a \$50,000 reward was offered by Daddy Warbucks?

Answer: Annie's parents or equivalents

15. It's not the Trans-Alaska Pipeline, but it consists of five miles of stainless steel tubing protected by concrete arches, sprawling across a desert in the Pacific Northwest. Inside it and its counterpart in Louisiana, a laser beam will bounce between mirrors at either end of the L-shaped structures in an attempt to discover ripples in space-time. For 10 points--name this NSF project which will begin to look for gravitational waves in 2002.

Answer: Laser Interferometer Gravitational-Wave Observatory or LIGO

16. In 1659, Thomas Mayhew sold this island to nine Quakers for 'thirty pounds and two beaver hats -- one for myself and one for my wife.' Later ceded to Massachusetts, it reached its peak just before the American Revolution, when it was home port to more than 125 whaling ships. For 10 points--name this only place in America that is an island, a county, and a town, and whose Indian name, meaning 'sandy, sterile soil tempting no one' is often used in limericks.

Answer: Nantucket

17. You might hear one of these people whispering "busy, busy," whenever they think about how complicated and unpredictable the machinery of life really is. Before committing suicide, one would say, "Now I will destroy the whole world." Two of them might engage in the boko-maru, a ritual in which they thrust their bare feet together. For 10 points--name these followers of a religious leader on the island of San Lorenzo in the novel *Cat's Cradle* by Kurt Vonnegut.

Answer: Bokononists (accept: followers of Bokonon or Bokononism)

18. Martina, Johanna, Rupert, and Hedwig are dead. Rosmarie, Maria, and Werner are retired in Vermont. Eleonore and her nephew George are fighting Johannes for their rightful share of the family lodge and resort in Stowe, Vermont, which their parents, Maria and Georg, bought in 1942. For 10 points--name this large family who really took a train to Italy, rather than crossing the Alps on foot to escape Nazi Austria as portrayed in a 1959 musical.

Answer: von Trapp

- 19. The players place black and white stones on a rhombus tiled with hexagons. The stones are never moved, and each player tries to form a connected chain of his colored stones between two opposite edges of the board. This is a zero-sum, two-person game invented by and named for the 1994 Nobelist in Economics. For 10 points, what is this name that also refers to a non-cooperative equilbrium? Answer: Nash
- 20. In 1509, he designed the architectural background for Raphael's 'School of Athens,' and, according to Vasari, was represented as Euclid in the fresco in return. His nickname 'Master Wrecker' came from his part in the destruction of the Basilica of Constantine, whose ruins stood on the site of his most famous work. For 10 points—name this principal architect and engineer of Pope Julius II, who died shortly after construction of his plans for St. Peter's Basilica had begun.

Answer: Donato Bramante

21. There is a price of \$1,250 on her head. That seems a small sum by Western standards, but in her native country it's a substantial bounty. After her novel *Shame* depicted Muslim atrocities against a Hindu family, and she was quoted in an Indian paper as saying the Koran needed revision, who--for 10 points--was forced to hide from Islamic fundamentalists and flee from Bangladesh in 1994?

Answer: Taslima Nasrin

22. Its inventor's wife once remarked that she did not mind bearing children but that the first two years were hard to take. Warm air, moved by convection or a fan, depending on the outside temperature, rises through a tightly stretched woven plastic sheet surrounded by clear plastic or glass walls which provide a soundproof and germ-free environment for growth and development. For 10 points-name this 'baby box' in which B.F. Skinner raised his second daughter.

Answer: Aircrib (prompt on 'baby box')

23. In the introduction to his most famous work, he stated that it was necessary to conceal his true meaning from those who, lacking the proper qualifications, might misread the book and abandon observance of the law. For 10 points--which philosopher and codifier of Jewish law included deliberately contradictory remarks concerning the existence of God in his 'Guide for the Perplexed?'

Answer: Maimonides or Moses ben Maimon

24. In the Friedman test, this animal is injected with urine possibly containing human chorionic gonadotropin. The animal is then dissected to see if hCG has caused bulging masses in its ovaries. Contrary to what you might infer from Aerosmith's song, "Sweet Emotion," the death of--for 10 points--what animal is not related to the outcome of this test for pregnancy in humans?

Answer: rabbit

25. In his 1857 book, *The Origin of the Alps*, he assumed that mountain formation caused volcanism instead of the other way around, and argued that mountains are formed by horizontal rather than vertical movements of the Earth's lithosphere. For 10 points—name this Austrian geologist who in his work *The Face of the Earth* coined the name "Gondwanaland."

Answer: Eduard Suess

1998 Western Invitational VI - The Buzz-erkeley Bowl Boni by Caltech (R. Mason, C. Nolte, M. Swiatek)

1. Welcome to ACF. Name these once important yet now obscure gods for 15 points each.

1. The three major priests at Rome were the flamines of Jupiter, of Mars, and of this god. By the late republic he was considered to be the immortal form of Romulus. His name means something like "he of the town of the Sabines", and sounds like one of the seven hills of Rome.

Answer: Quirinus

2. This Greek god, who was widely worshiped, was the son of Apollo and the father of Actaeon. He introduced the cultivation of bees and the vine and olive. His name is derived from a Greek word meaning "the best."

Answer: Aristaeus

2. Identify these Russian rivers for 10 points each.

1. This river begins northwest of Moscow and flows generally southeastward over 3500 km before emptying into the Caspian Sea.

Answer: Volga

2. This river rises in Smolensk west of Moscow and flows 2200 km south through Belarus and Ukraine before emptying into the Black Sea.

Answer: Dnieper (or Dnepro, Dnipro)

3. This river flows in a generally southerly direction for nearly 1900 km, from south of Moscow to the Gulf of Taganrog in the Sea of Azov. It is perhaps best known as the setting for several novels by Mikhail Sholokhov.

Answer: Don

3. 30-20-10. Name the silvery-white element.

- 1. When compressed to 26% of its normal volume, it becomes superconducting, making it the only alkali metal with this property.
- 2. Found in the minerals pollucite and lepidolite, this first element to be discovered spectroscopically was named for two distinctively coloured lines of its spectrum.
- 3. This most alkaline and electropositive element is used in getter pumps and atomic clocks.

Answer: cesium or Cs

- 4. As we all know by now, a president can be impeached for "Treason, Bribery, or other high Crimes and Misdemeanors."
- 1. For 10 points, who famously defined an impeachable offense as "whatever a majority of the House of Representatives considers it to be at a given moment in history"?

Answer: Gerald Rudolph Ford or Leslie Lynch King

2. For 10 points, what Supreme Court justice's impeachment was Ford discussing?

Answer: Associate Justice William O. Douglas

3. Ford considered Douglas' writings to be seditious, and alleged that Douglas had connections to organized crime and pornographers, thus claiming that Douglas had violated what additional Constitutional requirement for judges, which does not apply to other civil officials?

Answer: good Behaviour

- 5. Given the acronym and a brief description of a personality test, expand the acronym for 10 points each:
- 1. The MMPI uses a few hundred true-false questions to assign a score on a number of clinical subscales, for depression, schizophrenia, paranoia, etc.

Answer: Minnesota Multiphasic Personality Inventory

2. The CPI assigns ratings for such things as sociability and self-control. Unlike the MMPI, the CPI was designed for use with "normal" people.

Answer: California Psychological Inventory

3. The TAT requires the testee to make up stories about 20 pictures of people in different situations.

Answer: Thematic Apperception Test

- 6. "There were giants in the earth in those days." Answer the following for 10 points each:
- 1. What Norwegian-American wrote the novel known in English as Giants in the Earth?

Answer: (Edvart) Ole Rolvaag

2. The phrase "giants in the earth" in Genesis 6:4 refers to what race of people, the offspring of the sons of God and the daughters of men, described as "mighty men" and "men of renown"?

Answer: Nephilim

3. The Nephilim appear again in this book of the Bible, when Moses sends spies into the land of Canaan. The spies report seeing giants in whose sight they were like grasshoppers.

Answer: Numbers (13:33)

7. Identify the following associated with belief in God for the stated number of points.

1. First for five, name the 17th century philosopher who asserted that if one cannot prove that God exists, one should choose to believe in him in order to gain eternal life if one is right, but lose little if one is wrong.

Answer: Blaise Pascal

2. In his 1846 'Concluding Unscientific Postscript,' Kierkegaard used this metaphor to describe commitment to an objective uncertainty, specifically to the Christian God. For ten, what is it?

Answer: leap of faith

3. For fifteen, William James and Ralph Barton Perry advocated this belief system, in which God himself is in the process of achieving fulfillment, leaving him distinct from the universe he permeates and unifies.

Answer: finite God

- 8. The three types of neutrinos are each associated with and named for a different charged lepton. Name the neutrino type from a description, for 10 points each.
- 1. This type of neutrino was first reported to have been detected experimentally by Fermilab in July 1998.

Answer: tau neutrino

2. A recent experiment in Japan suggested that neutrinos of this type might be eluding detection by changing into tau neutrinos as they pass through the atmosphere--a transformation that would imply that neutrinos have mass.

Answer: muon neutrino

3. This type of neutrino is emitted along with a positron in positive beta decay. It was first observed experimentally in 1956.

Answer: electron neutrino

9. Kurosawa Akira died recently and is therefore fair game for quiz bowl questions. For ten points each, name the literary work upon which the following Kurosawa films are based -- five points if you need the original author.

1st 10 - Throne of Blood

1st 5 - William Shakespeare

Answer: Macbeth

2nd 10 - Ran

2nd 5 - William Shakespeare

Answer: King Lear

3rd 10 - Donzoko

3rd 5 - Maxim Gorky

Answer: The Lower Depths

- 10. Pulitzer Prize-winner Allan Drury is also dead and therefore fair game for question material -- name these novels of his for ten points each.
- 1. This 1995 offering concerns the sadistic 'Seedy' Sidi bin Sidi bin Sidi, an unstable Third World dictator with a nuclear arsenal, who must be stopped by Secretary of State Raymond Cass Stanley.

Answer: A Thing of State; a Novel

2. Followed by the sequel 'More Than a Shade of Difference,' this is Drury's most famous novel, for which he won the Pulitzer Prize in 1960.

Answer: Advise and Consent

3. This is Drury's second most famous novel, published in 1973; it's subtitled 'The Presidency of Edward M. Jason.'

Answer: Come Nineveh, Come Tyre

- 11. Answer the following about religious wars in France for 10 points each:
- 1. Identify the anticlerical heretics who held a Manichaeistic belief that good and evil had separate creators, and who were popular in southern France in the 12th and 13th centuries.

Answer: Albigenes or Albigensians (accept Cathars or Cathari)

2. Identify the pope who in 1209 launched a crusade against the Albigensians which ended in the subjugation of southern France.

Answer: Innocent III

3. Identify the mother of Louis IX who, as regent of France, conducted part of the crusade against the Albigensians and ended it with the 1229 Treaty of Paris.

Answer: Blanche of Castile

- 12. Sick of questions on El Nino? Here's one on that other ominous environmental spectre: global warming!
- 1. This atmospheric gas is the most important contributor to the greenhouse effect, and is primarily responsible for raising the Earth's average temperature from a frigid 255 degrees Kelvin to 288 Kelvin.

Answer: water vapor or H2O

2. The concentration of this second most important greenhouse gas has increased from 280 parts per million before the Industrial Revolution to over 360 ppm today. Fears of global warming are primarily due to the concern that this will eventually lead to an enhancement of the natural greenhouse effect.

Answer: carbon dioxide or CO2

3. The third most important greenhouse gas is emitted in far less quantities than carbon dioxide, but it is 25 times more efficient at absorbing infrared radiation. Its principal emissions sources include wetlands, rice cultivation, livestock, and fossil fuel combustion.

Answer: methane or CH4

- 13. 'Pastoral scene of the gallant South,/The bulging eyes and the twisted mouth,/Scent of magnolia sweet and fresh,/And the sudden smell of burning flesh!'
- 1. For ten points, these lyrics come from what 1939 jazz classic penned by 'Lewis Allen' which was adopted as an anthem against racism by the NAACP?

Answer: Strange Fruit Grows on Southern Trees

2. 'Strange Fruit' became the signature song of, for ten points, what singer known as 'Lady Day' and author of the autobiography 'Lady Sings the Blues?'

Answer: Billie Holiday

3. 'Lewis Allan' was a pen name for, for ten points, what musician, high school teacher, and closet Communist best known for raising the two orphaned sons of Julius and Ethel Rosenberg?

Answer: Abel Meeropol

- 14. Identify these battles of the Mexican War for 10 points each.
- 1. A U.S. army of 5000 under General Zachary Taylor defeated a much larger Mexican army under Santa Anna in this February 1847 battle near Monterrey.

Answer: Buena Vista or Angostura

2. While Taylor held ground in northern Mexico, American forces under Winfield Scott besieged and captured this key seaport east of Mexico City.

Answer: Veracruz

3. Scott's forces marched inland from Veracruz and defeated Santa Anna at this April 1847 battle, the last major conflict before the eventual capture of Mexico City and Mexico's surrender.

Answer: Cerro Gordo

- 15. English painters are damn confusing. For ten points each, name these.
- 1. Named the first president of the Royal Academy by George III, this man's portrait of 'Mrs. Siddons as the Tragic Muse' hangs in the Huntington Gallery.

Answer: Sir Joshua Reynolds

2. For his own portraits, George III preferred this man to court painter Reynolds. Some of his landscape drawings reside in the National Gallery along with his portraits of Mrs. Richard Brinsley Sheridan and Mrs. Siddons.

Answer: Thomas Gainesborough

3. Elected president of the Royal Academy in 1820, this man instrumental in the founding of the National Gallery is famous for his portrait of Queen Charlotte and one of Mrs. Siddons which hangs in the Tate Gallery in London.

Answer: Sir Thomas Lawrence

- 16. Identify these men on a 15-5 basis:
- 1st 15 Concerned about atheistic implications of Newtonian mechanics, he attacked the logical foundations of calculus in his 1734 book, *The Analyst; or a Discourse Addressed to an Infidel Mathematician*.
- 1st 5 This Anglo-Irish bishop is known for his Empiricist philosophy that things exist only insofar as they can be perceived.

Answer: George Berkeley (pronounced 'Barkley' -- accept 'Berkeley' only with a sneer)

- 2nd 15 In 1736 he wrote An Introduction to the Doctrine of Fluxions, and a Defence of the Mathematicians Against the Objections of the Author of The Analyst, in which he countered Berkeley's attacks on calculus.
- 2nd 5 This English mathematician's famous theorem is that the probability of B given A is equal to the probability of A given B, multiplied by the probability of B, divided by the probability of A.

Answer: Thomas Bayes

17. If you, like me, always guess 'Leakey' when asked for an anthropologist, hoping you won't be prompted, you are out of luck. For ten points each, tell me which Leakey discovered each of the following:

1. Homo habilis and Kenyapithecus

Answer: Louis Seymour Bazett Leakey

2. Proconsul africanus and Zinjanthropus

Answer: Mary Douglas Leakey

3. Australopithecus boisei and Homo erectus

Answer: Richard Erskine Frere Leakey

- 18. Answer the following about lasers for ten points each.
- 1. For ten points, all or nothing, what does the acronym LASER stand for?

Answer: Light Amplification by Stimulated Emission of Radiation

2. Everyday, visible-light-range lasers, like pointers and bar code scanners, use a mixture of two noble gases to create the lasing effect. For five points each, name them.

Answer: Helium and Neon or He and Ne

3. If you really want to impress visitors to your lab, it helps to have a Nd: YAG (pronounce: Neodymium yag) laser around. The acronym YAG represents a synthetic crystal of the oxides of the elements represented by Y and A. For five points each, name them.

Answer: Yttrium and Aluminum (the 'G' is for garnet)

- 19. The picturesque tourist trap of Carmel, California is sometimes said to be "a place for the newly wed and the nearly dead." For 10 points each, identify these people who died in Carmel.
- 1. This 8-time Wimbledon champion dominated women's tennis for nearly a decade, winning every set in singles play between 1927 and 1932. She died on New Years Day, 1998.

Answer: Helen Wills Moody (Roark) (accept any of the last three names)

2. This politician, who died in 1973, is best known for her feminism and her pacifist stances. In 1968, at the age of 87, she led 5000 women to Capitol Hill to demonstrate opposition to the hostilities in Indochina.

Answer: Jeannette Rankin

- 3. Noted works by this controversial poet, who died in 1962, include <u>Tamar and Other Poems</u>, <u>Cawdor</u>, and <u>Be Angry at the Sun</u>.

 Answer: (John) Robinson Jeffers
- 20. In the movie The Truman Show, screenwriter Andrew Niccol displayed his usual love for symbolic character names. For 10 points each:
- 1. What was the name of the television interviewer played by Harry Shearer?

Answer: Mike Michaelson (accept either name)

2. What was the name of the God-like director played by Ed Harris?

Answer: Christof

3. Truman's first name, of course, reflects the fact that, unlike everybody around him, he is a real person--"there's nothing fake about Truman." Truman shares his last name with what California city which houses studios for Disney, Warner Brothers, Columbia Pictures, and NBC?

Answer: Burbank

21. Given the one-letter stock ticker symbol, name the company it represents for five points each, and a bonus five points for all correct.

1. T Answer: <u>AT&T</u> Corp.

- 2. X Answer: USX-US Steel Group (acc. USX)
- 3. S Answer: Sears Roebuck & Co 4. G Answer: Gillette Company 5. K Answer: Kellogg Company
- 22. Identify these Noel Coward comedies for 10 points each:
- 1. All the members of the eccentric Bliss family invite guests to stay for the weekend without telling the other members of the family. At breakfast on the second day the guests all escape while the oblivious family argues about Paris.

Answer: Hay Fever

2. A divorced couple, Elyot and Amanda, who have each remarried, meet again while they are both on their honeymoons. They find that they still have a powerful love-hate relationship and run off together away from their new partners.

Answer: Private Lives

3. A seance brings back the spirit of a man's dead first wife, who hangs around making trouble, much to the displeasure of his living second wife.

Answer: Blithe Spirit

- 23. Identify these Chinese dynasties for 10 points each.
- 1. Lasting from 1122-256 B.C., this dynasty had the longest reign in Chinese history. Confucius and Lao-tzu lived during this period.

 Answer: Chou or Zhou (pronounced "Joe")
- 2. After northern and southern China had been ruled separately for four centuries, the country was reunified under this dynasty, which only lasted from 581-618 before being succeeded by the Tang.

Answer: Sui (prounounced "sway")

3. Under this perhaps most xenophobic of all Chinese dynasties, Chinese people were forbidden to have contact with foreigners except for state business or under close state supervision. Notable literary works of this period include the pornographic satire *The Golden Lotus*.

Answer: Ming

- 25. Name the following classes of plant hormones for ten points each.
- 1. IAA is the most important of this class of hormones, which influence phototropism and geotropism and stimulate protein synthesis, inhibiting aging.

Answer: auxins

2. Named for a fungus which produces excessive growth and poor yield in rice plants, this class of hormones abundant in seeds, young leaves and roots promote the growth of the main stem of the plant.

Answer: gibberellins

3. Also synthesized in the roots, this class of hormones prevents yellowing of leaves by stabilizing protein and chlorophyll content in the leaf, as well as chloroplast structure.

Answer: cytokinins