

# Fatal Air Transport Accidents Involving Athletic Teams from the United States

**REFERENCE:** Murphy GK. Fatal air transport accidents involving athletic teams from the United States. *J Forensic Sci* 1997;42(1):74-8.

**ABSTRACT:** Team sports at multiple levels of competition have steadily grown more popular and more economically significant in the United States and Canada during the past 150 years. Year-round competition across these large countries requires continual, reliable, and safe transportation of teams and their supporters, often by air, with the potential albeit small for loss of athletes, coaches, and entire teams in air crashes and other accidents. This paper reviews potential and actual accidents involving United States athletic teams from the 1930s to the present, including four fatal air charter crashes from 1960 through 1977. Common factors in crashes included inclement weather, component failure, human factors, and overloading or misloading aircraft. The safety of commercial and charter aviation has been significantly improved. However, weather, human factors, and ongoing maintenance and inspection of aircraft for safety remain significant problems which call for continued vigilance.

**KEYWORDS:** forensic science, forensic pathology, aircraft accidents, mass disaster investigation, sports, air transport, review

Team sports, including interscholastic, intercollegiate, and professional competition, were introduced in the United States beginning in the mid- and late-1800s. These sports, baseball, football, and basketball, in particular, have exhibited continuing steady growth in numbers of participants, complexity, public following, and financial investment.

Competition in these team sports, as well as in ice hockey, soccer, track and field, and Olympic and other international sport is continual throughout the year across the United States and to a lesser extent, in Canada.

Inherent in scheduling these thousands of athletic contests is the capacity to consistently, reliably, and safely transport teams ranging from a few to more than 100 persons, their equipment, and their supporters back and forth across and among these countries.

Many intercollegiate and most major professional teams now travel by air. This was not always so. Until the 1940s and 1950s teams traveled by automobile, bus, and rail. Although accidents and late arrivals periodically occurred, an entire team being seriously injured or killed in an accident en route to or from a contest was highly unlikely.

The introduction and the progressive growth of commercial, charter, and civil air transport beginning in the 1930s eventually made possible more rapid and reliable team transport. However,

<sup>1</sup>Associate pathologist, Miami Valley Hospital, and assistant coroner, Montgomery Co., Dayton, OH.

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inherent in this progress was the prospect that both athletes and coaches, even an entire team, could be lost in a single air transport accident.

This paper reviews nine major, fatal, and nearly fatal ground and air transport accidents involving United States athletes and coaches beginning in the 1930s; examines in detail four major fatal air charter accidents involving intercollegiate teams from 1960 through 1977; and concludes with a survey of present conditions in the area under discussion. The nine accidents are designated in chronological order Cases 1 to 9, inclusive (Table 1).

## Materials

Published narratives of incidents and accidents; National Transportation Safety Board (NTSB) aircraft accident reports, and various other sources were consulted in compiling this review.

## Review

Case 1: On March 31, 1931 Knute Rockne, the legendary football coach of the University of Notre Dame, six other passengers, pilot and copilot boarded Transcontinental and Western Airways (later, TWA) flight 99E in Kansas City, bound for Wichita, Kansas. The aircraft was a Fokker F-10A trimotor, a high-winged monoplane powered by three Pratt and Whitney Wasp engines, and having a fuselage of metal tubing, but wings constructed entirely of wood and covered by fabric. Wichita weather was cloudy, but visibility was good. However, there were low-lying heavy clouds and reported icing between Kansas City and Wichita.

A rancher beneath the flight path saw the plane dive steeply from the sky; it crashed inverted, killing all occupants. The left wing was found lying on a rise 0.6 km from the site of impact.

The Aeronautics Branch of the Department of Commerce in Washington, D.C. investigated the crash, and concluded that ice which had formed on the wings had caused loss of control; an uncontrollable steep dive; and resultant separation of the left wing in flight. As an immediate result, many F-10's and F-10A's were temporarily or permanently grounded. Impetus was thus supplied for the development of all-metal aircraft such as the pioneering DC-1 and DC-2, and the legendary DC-3. Public confidence in the Federal government's concern for aviation safety was also bolstered thereby (1).

Case 2: A nearly fatal incident involving a college football team traveling by chartered bus preceded by 10 years the first of the four fatal air charter accidents. In November 1950, 34 players, coaches, officials, and special guests of the Western State College of Colorado football team set out by chartered bus from their home city of Gunnison, Colorado over US Route 50 through the Rocky Mountains for a game with Adams State College at Canon City,

TABLE 1—*Fatal and nearly fatal transport accidents of US athletic teams, 1931–1980.*

Case	Date	Team or Person	Mode of Transport	Location	Type	Injuries: Fatal	Nonfatal
1	3/31/31	Football coach (ND)*	Aircraft (F-10A)	near Bazaar, KS	In-flight crash	9	0
2	11/—/50	West. St. (CO) FB†	Bus	US Rt. 50 (CO)	Failure of air brakes	0	0
3	1/18/60	Mpls. Lakers (NBA BB)‡	Aircraft (DC-3)	Carroll, IA	In-flight generator failure	0	0
4	10/29/60	Cal. Poly. FB	Aircraft (C-46)	Toledo, OH	Crash on takeoff	22	10
5	8/31/69	Professional boxer	Aircraft (Cessna 172)	Newton, IA	In-flight crash	3	0
6	10/2/70	Wichita St. (KS) FB	Aircraft (M 404)	Silver Plume, CO	In-flight crash	30	10
7	11/14/70	Marshall Univ. FB	Aircraft (DC-9-31)	Huntington, WV	Crash on landing	75	0
8	12/13/77	Evansville Univ. BB§	Aircraft (DC-3)	Evansville, IN	Crash on takeoff	29	0
9	3/14/80	US amateur boxing	Aircraft (IL-62)	Warsaw, Poland	In-flight crash	87	0

\*ND—University of Notre Dame; †FB—football; ‡NBA BB—National Basketball Association basketball; §BB—basketball.

Colorado. Bus driver Jerry Tobin was skillful and experienced; the bus was apparently in excellent condition.

Just after crossing 3424-m Monarch Pass and starting down-grade in low gear, Tobin heard a dull thump from beneath the bus, following which the air pressure rapidly dropped to zero, both rendering the brakes inoperable and disengaging the air-operated clutch. The coasting bus rapidly reached 96, then 128 kph. Ahead of the bus were 27.2 km of consistently steep descending grade including six major hairpin curves on a road hemmed in on one side by a perpendicular rock wall, and on the other having a precipitous drop of thousands of meters.

The courageous and resourceful driver quickly realized that the 2250 to 2700 kg combined weight of the 34 passengers and football equipment could be and must be used to help keep the bus on the road. He repeatedly shouted orders for all to throw themselves to the rock wall side of the bus each time it approached a curve, eventually at speeds up to 176 kph. By doing so, and with Tobin's extraordinarily skillful direction and driving, they managed to counteract centrifugal force pulling the bus to the outsides of the curves and potential destruction. Tobin finally brought the bus to a halt on the level outside of Salida, Colorado, where he was mobbed by his grateful and cheering passengers.

Inspection revealed that a piece of dirt had held open a valve between air tank and brake system, causing the air to leak out and resulting in complete loss of pressure. At least in part as a result of this near-tragedy, foolproof valves; emergency brakes; non-air-powered clutches; and electric horns were eventually required on buses (2).

Case 3: A combination of inclement weather and generator failure resulted in a potentially fatal situation for a professional basketball team in January 1960, tragedy being averted by the actions of the skilled and experienced pilots.

The National Basketball Association's (NBA's) Minneapolis Lakers flew to St. Louis on Sunday, Jan. 18, on their team plane, a DC-3. By the completion of the game, at which time the Lakers were to return to Minneapolis, a snow and sleet storm had invaded the Midwest resulting in delay in takeoff. The plane's generator then failed, resulting in additional delay.

The plane finally departed Lambert Field at about 8:30 p.m., only to have the generator fail again 10 min into the flight, permanently disabling lights, heating, navigation devices, and radio. Lacking radio guidance back to St. Louis, the pilots elected to climb to 4500 m and to steer toward Minneapolis by celestial navigation. What would normally have been a two-hour flight continued for three and one-half hours, during which icing gradually enveloped the plane. Low on fuel and unsure of their position, the pilots

descended below cloud to discover below, endless flat snow-covered cornfields near Carroll, Iowa, about 240 km off the course to Minneapolis. Scraping ice from the windshields from inside, the pilots eventually brought the plane and its frigid passengers and crew down to a perfect belly-landing upon a field of uncut corn covered with one meter of soft snow, from which they battled through deep drifts on foot to an old hotel in Carroll where they spent the night (3).

Case 4: The first of three fatal air charter crashes involving college football teams occurred on the night of Oct. 29, 1960. The California Polytechnic football team, having been scheduled for what at that time was still called an "intersectional" game, flew to Toledo, Ohio, to play the strong Bowling Green State University Falcons at Bowling Green, south of Toledo. The team was soundly defeated.

The return flight to California that night found the Arctic-Pacific Airlines C-46 laden with 48 persons and the team's equipment. The plane crashed on takeoff at Toledo Airport, killing 20 and seriously injuring 10 of the 45 passengers, and killing two of the three crew members. The plane was destroyed.

The probable cause of the crash was determined to be the loss of control during a premature liftoff, with an overweight aircraft, inclement weather, and partial loss of power in the left engine contributing (4). Bowling Green subsequently played at least one football game on the West Coast to provide some financial assistance to California Polytechnic survivors and involved families. In the autumn of 1970, two fatal air charter accidents involving college football teams occurred within a period of about six weeks.

Case 5: Rocky Marciano, who had retired in 1956 as the only undefeated heavyweight boxing champion in history, was one of three persons killed when their hired Cessna 172 crashed in a storm near Newton, Iowa on the night of Aug. 31, 1969 on a flight from Midway Airport, Chicago, to Des Moines, Iowa (5).

Case 6: On Friday, Oct. 2, two Martin 404 aircraft owned by the Jack Richards Aircraft Co., Inc. of Oklahoma City, Oklahoma, were to be used to transport the Wichita State University football team, its equipment, and other persons from Wichita, Kansas to Logan, Utah for a game with Utah State University. The two aircraft were ferried to Wichita in the morning of Oct. 2. Martin N464M was boarded by 36 passengers and a crew of four, and Martin N470M by 35 passengers and a crew of three. The direct flights to Stapleton International Airport at Denver, Colorado were uneventful; both aircraft were serviced there. The Captain and First Officer of Martin N470M had proposed a flight plan from Denver, northwest via Laramie, Wyoming, then, to Logan via Rock Springs, Wyoming, "... provid(ing) an initial flight path parallel

to the mountain ranges, allowing ample time for the aircraft to reach a safe en route altitude prior to turning westward over the mountains" (5). A copy of the plan was given to the First Officer of Martin N464M.

However, prior to and during the servicing stop in Denver, both pilots of Martin N464M were heard to state that they were planning to take a "scenic route" west from Denver to Logan over the Rocky Mountains. Martin N464M took off from Stapleton at 12:29 p.m., and proceeded north, then west-southwest along Clear Creek Valley and US Highway 6, toward Loveland Pass (3600 m msl). A number of witnesses on the ground were surprised that the aircraft was at so low an altitude and apparently at cruising power, rather than climb power, in clear weather over this high mountainous terrain. Following two sudden turns, the aircraft crashed, caught fire, and was destroyed at 3225 m msl on Mount Trelease (3734 m msl), 12.8 km west of Silver Plume, Colorado. The Captain and another crew member, and 28 of the 37 passengers were killed. Martin N470M proceeded safely to Logan, Utah as planned.

The probable cause of the accident was unanimously determined by the NTSB to be, "intentional operation of the aircraft over a mountain valley route at an altitude from which the aircraft could neither climb over the obstructing terrain ahead, nor execute a successful course reversal" (5). "Significant factors" were the lack of operational management to monitor and control flight crew actions; the crew's lack of understanding of the aircraft's performance capabilities and limitations; the lack of firm flight planning for the Denver to Logan flight segment; and an aircraft overloaded by approximately 2359 kg at takeoff.

The NTSB stated in its final report that "... there was a disagreement among the three interested parties" (including Wichita State University) "concerning the designation of 'operator'" (5) of the aircraft in question. Thus, the Board also issued a Safety Information release recommending that "... all potential users of large aircraft on a short-term charter basis question providers of such services as to the type of operations for which they have been certificated by the FAA" (5), this cautionary statement being included because in the opinion of the NTSB, "In certain instances, it would appear that the contractual relationships are designed to make the lessee the operator of the aircraft" and thus unknowingly "thereby be obliged to assume responsibilities beyond his capability" (5).

The NTSB also noted that "... a thorough investigation of all aircraft charter operations has been ordered by the Secretary of Transportation John A. Volpe ... and that the FAA has taken steps to inform educational institutions of the aviation regulations incident to the operation of large aircraft" (5). The intercollegiate football program at Wichita State University was continued following the crash.

Case 7: The Marshall University football team from Huntington, West Virginia had played a game in the State of North Carolina on Saturday Nov. 14, 1970 and was to return from Kinston, North Carolina to Huntington that same night via DC-9-31 charter Flight 932 of Southern Airways, Inc. The aircraft departed Kinston at 6:38 p.m. with 70 passengers, a crew of four, and an airline charter coordinator on board. Radio contact with Huntington Approach Control was established at about 7:23 p.m. The Huntington weather was overcast, with scattered cloud, light rain, and fog.

In the process of attempting a nonprecision instrument landing approach, the aircraft initially struck trees on a hill about 1.6 km west of the runway threshold, crashed and burned, killing all 75 persons on board.

The NTSB investigation concluded that the pilots may have mistaken the glow of lights through broken cloud of a refinery located about 3.2 km to the west of, and slightly south of, the runway threshold but about 90 m below it for the runway approach lights, and that the crew never sighted the latter while descending through minimum descent altitude (MDA) unawares.

The probable cause was determined to be descent below MDA during a nonprecision approach under adverse weather conditions and without sighting the runway environment. The Board concluded that the two most likely explanations for this descent were improper use of cockpit instrumentation data or a barometric or radio altimeter error (6).

The Marshall University teams were known as "The Thundering Herd." Intercollegiate football was continued, with a new team of players being named, "The Young Herd." Over succeeding years, Marshall University intercollegiate football attained the lofty position of competing for and winning National Collegiate Athletic Association (NCAA) Division 1-AA National Championships in the 1990s.

Case 8: On Dec. 13, 1977, a Douglas DC-3 passenger charter flight operated by National Jet Services, Inc. as Air Indiana 216 was to transport the University of Evansville basketball team and associated personnel from Evansville, Indiana to Nashville, Tennessee. Twenty-four passengers and their luggage and equipment; a crew of three; and two National Jet Services, Inc. officials were on board when the plane took off at 7:21 p.m. in light rain and fog. About one minute later, the plane was seen to have crashed and burned, killing all on board.

Evidence was discovered in the wreckage that the external right aileron and rudder control locks had been left in place before takeoff, and that they were in place when the aircraft crashed. Passenger baggage had been loaded almost entirely into aft baggage compartment H, resulting in a rearward center of gravity (c.g.) that was aft of the optimum range, but forward of the rearmost limit.

The NTSB determined the probable cause of the accident to be attempted takeoff with control locks installed which, in combination with a rearward c.g., resulted in the aircraft's rotating to a nose-high attitude immediately after takeoff and entering the region of reversed command, from which conditions the pilots could not recover (7). There have been at least two other fatal aircraft accidents involving an athlete and an athletic team from the United States.

Case 5: Rocky Marciano, who had retired in 1956 as the only undefeated heavyweight boxing champion in history, was one of three persons killed when their hired Cessna 172 crashed in a storm near Newton, Iowa on the night of Aug. 31, 1969 on a flight from Midway Airport, Chicago, to Des Moines, Iowa (8).

Case 9: Eighty-seven persons, including 14 members and the coach of the United States amateur boxing team traveling from New York City to Warsaw, Poland were killed when their Polish Airlines IL-62 airliner exploded and crashed near the Warsaw Airport preparatory to landing on March 14, 1980 (9).

## Discussion

Three of the four fatal intercollegiate team flights were aboard chartered, rather than commercial or internally owned aircraft and the fourth (Case 4), apparently so. It is listed as "Public," not as "Charter," but also, neither as "Domestic" nor "Scheduled" (4).

Problems in obtaining, crewing, and economically and safely operating charter aircraft, and in interpreting contracts pertaining

thereto as they existed in 1970 are discussed at length in the NTSB report of Case 6; these have been alluded to above (5).

Some intercollegiate and professional athletic teams have owned and operated, or own and operate their own aircraft, affording at least potential control over factors including those mentioned above. (However, a representative of a firm which has been the official travel agency for the NCAA since 1981 recently stated in a letter, "I would imagine only a handful of universities would own any equipment and they would probably be very small propeller driven aircraft. It is extremely expensive to own and operate any plane with the cost of fuel and maintenance today.")

Study and comparison of these seven fatal and two nearly fatal accidents reveals that each except Case 9 possesses at least one, and one of them, three, of four factors.

#### *Inclement Weather*

This is a factor which must be taken into consideration in every aircraft flight, and which despite improved means of weather detection and reporting has caused or contributed to commercial, civil, and military air crashes to this day.

Inclement weather clearly caused or significantly contributed to Case 1 and Case 3, and apparently contributed to Case 5. Inclement weather was cited as a contributory factor in Case 4 and Case 7. In addition, three of the four major fatal air charter crashes discussed above occurred in darkness at night.

#### *Overweight or Misloaded Aircraft*

The body weight of a trained intercollegiate or professional athlete is often significantly in excess of the "average" weight of a paying passenger used to estimate aircraft loading. To this must be added the not inconsiderable weight particularly of football equipment, and particularly when the latter is sodden with soil and water following a game played in inclement weather.

Significant underestimation of the average and total weights of a planeload of airborne troops and their equipment reportedly occurred prior to a fatal air-charter crash in Canada in December 1985 (10).

The aircraft in both Case 4 and Case 6 were overweight at takeoff. The aircraft in Case 8 was improperly loaded. Each of the three conditions was cited by the NTSB as a contributory cause or as a "significant factor" in the respective crash.

It is of considerable interest that reportedly, proposed overloading of the aircraft in Case 7 had been prevented by Southern Airways, the weight of passengers and baggage initially proposed as about 8863 kg having been reduced to 7954 kg *before* the airline would schedule the charter flight (6).

It is also of interest that each of the three overloaded or misloaded aircraft was a two-engine propeller-driven aircraft of some years of age, and although not inherently untrustworthy because of age alone, yet having smaller margin(s) of operational reserve than a larger and more generously powered aircraft.

#### *Human Factors*

Although human factors were not stated to have been a cause or a contributory cause of any of the fatal accidents, the choice of routing by the pilots in Case 6, and the failure of the crew in Case 8 to remove external control locks and to insure that their aircraft was properly loaded were each stated by the NTSB to be causative in the respective crashes. The pilot's apparently pressing

on into inclement weather in Case 5 must be considered as a possible contributory factor in this accident.

#### *Component Failure*

Airframe failure following icing precipitating loss of control, and mechanical failure following loss of air pressure; unilateral partial loss of engine power on takeoff; and possible altimeter error were cited as causative, contributory, or likely factors in Case 1 and Case 2; Case 4; and Case 7, respectively.

It is instructive and encouraging that despite the fatal accidents in Cases 1 and 6, and the nearly fatal accident in Case 2, thorough investigations by the agencies responsible yielded firm recommendations leading to improvements in safety for the traveling public, each of which has been previously discussed with regard to the respective accident.

#### **Summary**

There has not been a domestic air transport crash involving a United States athletic team resulting in major loss of life for the past 18 years, nor has there been such a crash on foreign soil for 16 years.

During this period of time, the number of United States and Canadian athletic teams and thus, the number of athletes at risk have increased, as have the number of games (contests) and thus, the number of miles flown by these athletes at risk. Therefore, air travel by these athletic teams is safer in both countries in both relative and absolute terms than it was 20 years ago, as is the case with commercial air travel in general. Worldwide passenger deaths in scheduled air services were 0.07 deaths per 100 million passenger miles in the year 1993, only 0.18 of the death rate of 0.38 deaths per 100 million passenger miles in the year 1974 (11).

Although at least most intercollegiate athletic teams continue to use charter aircraft, the aircraft are as a rule current types flown by commercial airlines and in civil aviation.

During the 1994 to 1995 academic year, the NCAA planned to spend more than \$18 million to transport student-athletes, teams, officials, and NCAA staff and committee members to and from their destinations.

A major United States airline, the official airline for NCAA championships, provides discounted round-trip coach fares for teams, student-athletes, and athletic staff during regular-season competition and recruiting. Another firm arranges rental automobile and minivan transportation for championships (12).

Along with improved long-range and short-range weather detection and reporting, the first improved wind-shear detection equipment is being installed at selected United States airports and in aircraft. Human factors have been concluded to be causative in some commercial air transport accidents. It is now widely recognized that factors such as weather, flight scheduling, fatigue, and personal problems may combine to place a pilot in a situation in which his or her judgment and/or actions are later concluded to have been inappropriate. Emphasis is being placed on improved cockpit communication and resource management (13).

It has long been believed and assumed that periodic airframe, component, and record inspections, and preventive maintenance would detect incipient or impending structural failures, inadequate documentation of maintenance, and misloading of aircraft before such proved harmful or fatal. However, this has not always been the case (14). Recent reports have also suggested that the FAA is experiencing a crucial shortage of experienced inspectors. Professional athletic leagues and teams are said to have contingency

plan(s) for replacing athletes injured or killed in a disaster with others, so that competition may continue.

In the interest of prompt and accurate identification of team members who might be killed in such a disaster, the author recommends that athletic leagues and teams implement concrete plans for the collection and retention in confidence of information and material which would be vital for such identification. This includes, but is not limited to: unique physical, and other identifying features; up-to-date dental records; fingerprints and footprints; and X-rays.

Disturbing as this might be to those involved, all could take some comfort in the knowledge that the likelihood of an accident requiring the use of this material is very small. Yet, although transportation of athletic teams is far safer than it once was, all concerned must be continually vigilant in insuring that it remains so.

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Reprints will not be available from the author. Additional information to:  
Gordon K. Murphy, M.D.  
143 Duffield Road  
Derby DE22 1AF, England

# ERRATA

**Erratum/Addendum to:** Murphy GK. Fatal air transport accidents involving athletic teams from the United States. *J Forensic Sci* 1997;42(1,Jan):75–9.

- One such accident involving significant loss of life was inadvertently omitted from this paper. On February 15, 1961, a Sabena Airlines Boeing 707 carrying the entire United States World Figure Skating team to the World Championships in Prague crashed near Brussels, Belgium. Eighteen American skaters, along with sixteen officials, coaches and family members, 27 other passengers, and a crew of 11, were killed, a total of 72 deaths. The cause of this crash is not known to me.

## Reference

Mitch D. A tragedy remembered. *Skating Magazine* 1986;Feb: 34–41 and 66–68.

*Editor's Note:* Any and all future citations of the original paper should read: Murphy GK. Fatal air transport accidents involving athletic teams from the United States. [published erratum/addendum appears in *J Forensic Sci* 1998;5(May)] *J Forensic Sci* 1997;42(1,Jan): 75–9.

## Erratum/Correction:

- An error in the values in one of the columns of one table in the following previously published paper require correction: Caldwell JP, Kim ND. The response of the Intoxilyzer 5000® to five potential interfering substances. *J Forensic Sci* 1997 Nov (6):1080–87. Below is reprinted Table 8 in its entirety from the above paper with the corrected values.

TABLE 8—Comparison of interference results from the Intoxilyzer 4011AS-A and the Intoxilyzer 5000

Interferent	Vapor Conc. (g/210 L)	Intoxilyzer 4011AS-A		Intoxilyzer 5000	
		Apparent Conc. (g/210 L)	Interference Light Trigger Point*	Apparent Conc. (g/210 L)	Interference Light Trigger Point*
Toluene	0.331	0.054	0.029	0.070	0.048–0.058
<i>m</i> -Xylene	—	—	—	—	0.042–0.059
<i>o</i> -Xylene	—	—	—	—	0.034–0.067
Isopropanol	0.152	0.101	0.029	0.059	0.011–0.019
Methanol	0.079	0.086	NT†	0.102	NT†

\* Specified in terms of the apparent ethanol reading (g/210 L)

† NT = not triggered

Any and all future citations of the above-referenced paper should read: Caldwell JP, Kim ND. The response of the Intoxilyzer 5000® to five potential interfering substances. [published erratum appears in *J Forensic Sci* 1998 May;43(3)] *J Forensic Sci* 1997 Nov;42(6): 1080–87.

## Erratum:

- The author's name should have been William Tompson, not Lawrence D. Muller in the Table of Contents for March issue of *J Forensic Sci* for correspondence of: Additional commentary on Budowle B, Lindsey JA, et al. validation and population studies of the loci LDLR, GYPA, HBG, D7S8, and Gc (PM Loci), and HLA-DQ- $\alpha$  using a multiplex amplifications and typing procedure'', *J Forensic Sci* 1995;40:45–54.